# AMERICAN DYESTUFF REPORTER

*"Circulated Everywhere Dyestuffs Are Used"*

**Published by Howes Publishing Company, 90 William Street, New York.**

**Devoted to the practical application of dyestuffs in all industries; especially to textile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.**

VOLUME XVI NEW YORK, MARCH 21, 1927 No. 5


# Buffer Substances in the Textile Industry

**Buffer Substances—Measurement of PH of Buffers—The Indicator Method—The pH of Buffer Salts—Examples of Buffer Action in the Textile Industry**


By ROBERT JAEGER and VICTOR COFFMAN

*Research Laboratories, Armour & Co.*


RECENTLY the need for close regulation of the acidity or alkalinity of wet textile processing has become increasingly appreciated. Two factors must be taken into consideration when discussing this question. One is the amount and the other is the intensity. The following example will make this clear:

A 5 per cent solution of sulphuric acid contains the same amount of acidity as a 6 per cent solution of acetic acid, as may be readily determined by titration. Their action on fabrics, however, is widely different. We may indicate this by saying that sulphuric acid has a greater intensity or activity than acetic acid. The two factors, *amount* and *intensity*, may be likened to the capacity and voltage of an electric battery, respectively. One tells how long the battery will last and the other how powerful it is.

## Buffer Substances

Buffers are substances which enable us to regulate the intensity factor of a solution so that it will work longer at a moderate strength, rather than more powerfully for a shorter time. For instance, taking the example already mentioned, a 5 per cent solution of sulphuric acid is harmful to fabrics because its hydrogen-ion concentration or its activity, is high; when to this solution we add sodium acetate the sulphuric acid combines with the sodium, producing free acetic acid, which is a weak acid and does not injure the fibers. The addition of sodium acetate thus changes the intensity of the acid in the solution but not its amount; the solution will still require the same amount of alkali for neutralization (using phenolphthalein as indicator). We say in this case that sodium acetate acts as a buffer toward sulphuric acid solution. All salts of weak acids with strong bases act as buffers toward stronger acids and similarly all salts of weak bases with strong acids (such as alum) act as buffers toward strong alkalies.

In a more restricted sense the term "buffer solution" has been used for solutions which are "buffered" both toward acids and toward alkalies. A solution of sodium acetate is "buffered" against acids but not against alkalies. In other words, the addition of sulphuric acid *will not* make it strongly acid, but the addition of caustic will make it strongly alkaline. If, however, the solution contains free acetic acid besides sodium acetate, then it is buffered toward both acid and alkali, because the addition of sulphuric acid will merely liberate more acetic acid, while if caustic is added it will be neutralized by the free acetic acid.

An amphotheric buffer solution, that is, one which acts both ways, must therefore contain a weak acid and its salt, or a weak base and its salt. "Neutral alum" used in mordanting and containing alum + $Al(OH)_3$ is an example of the latter. Soap containing some free fatty acid, as used in degumming, is another example of the first type. A compound of a weak acid with a weak base, aluminum acetate, for instance, is also an amphotheric fiber.

Many organic substances, such as glue, belong to this type because they contain in their molecule weak acidic (COOH) and basic ($NH_2$) groups. Wool and silk act as buffers toward acids and are consequently much less affected by them than cotton is.

A different kind of buffer action is shown by the effect of Glauber salt ($Na_2SO_4$) on sulphuric acid solution.

According to the mass action law* the sulphate ions of the Glauber salt reduce the dissociation or breaking up of the sulphuric acid molecule into sulphate ions and hydrogen ions. The acidity of a solution is measured by the concentration of its hydrogen ions, so in virtue of the presence of Glauber salt the solution becomes less acid.

### Measurement of pH of Buffers

The intensity of acidity or alkalinity may be measured in several ways. One of the most accurate methods is the hydrogen electrode. This is based on the fact that when an acid or alkaline solution is placed in contact with hydrogen gas (absorbed on platinum black) an electrical potential difference is produced which is proportional to the intensity or the concentration of hydrogen and hydroxyl ions in the solution. Since the principle of the hydrogen electrode has been previously described in this journal[1], we need not go into details here. It will be recalled that the intensity is expressed in terms of pH. Fig. 1 shows in graphic form the relation between the pH of a solution and the concentration of a fully dissociated (strong) acid or base. The graph is plotted on semi-log paper and enables one to translate directly the pH into hydrogen or hydroxyl-ion concentration; for instance, a solution of pH 3.3 corresponds to a concentration of 0.0005 normal strong acid, that is, 0.002 per cent $H_2SO_4$ or 0.0015 HCl.

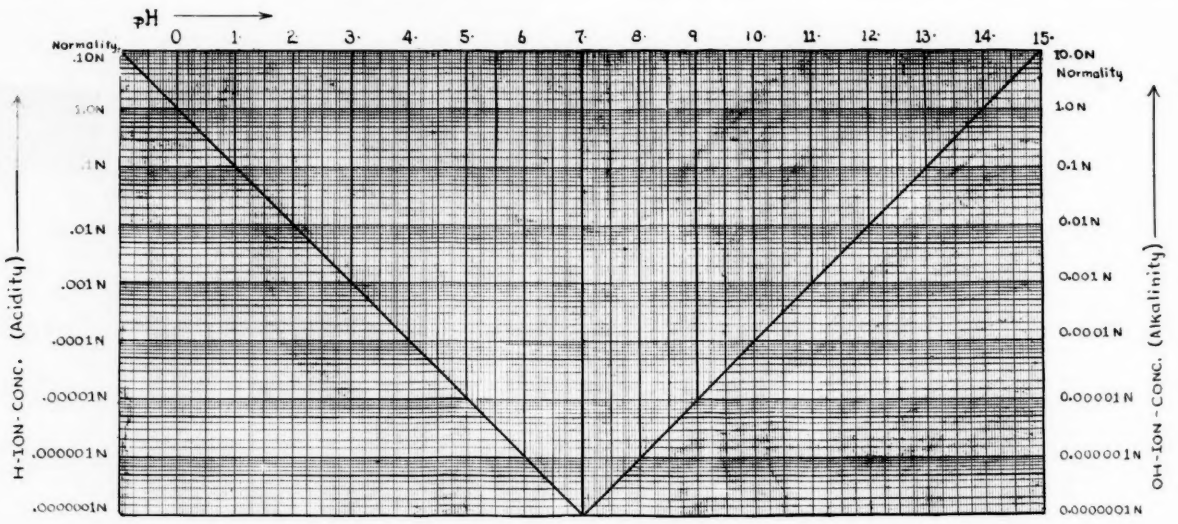


Fig. 1.—*pH Acidity or Alkalinity of Solution*

It will be noticed that numerically the pH is greater, the greater the alkalinity. It varies directly as the logarithm of the OH-ion concentration and inversely as the logarithm of the H-ion concentration. (See Fig. 1.)

The hydrogen electrode, originally a laboratory apparatus requiring much care in its use, has of late years been considerably improved and adapted to factory requirements. Figs. 2 and 3 show new and convenient forms of acidity meters made by Leeds & Northrup Company. The first is a portable instrument which may be carried about the plant. The second is an automatic recording potentiometer which gives a continuous record of the acidity or alkalinity of solutions and may be used, in connection with other devices, to provide automatic control.

Fig. 4 shows how the hydrogen ion concentration (acidity) of solutions of several acids is changed by the addition of alkali. The curves were obtained with a Bovie H-ion potentiometer by Leeds & Northrup Company.

The electrode method is especially valuable when colored solutions have to be tested because the indicator method in many cases will fail. Some solutions "poison" the electrode and in such cases naturally it cannot be employed.

### The Indicator Method

Every chemist knows that phenolphthalein becomes red in alkaline solutions (pH 8.5 to 10) while Methyl Red does so on the acid side (pH 3 to 4). There are other organic compounds that change color at other pH values. By noticing which of these dyestuffs change color when added to a given solution, one may determine the acidity or alkalinity (pH) of the solution. In Clark's book on "The Determination of H-ion Concentration"—the stand-

*The mass action law states that the product of the concentrations of the ions is proportional to the concentration of the undissociated molecules. Thus when sulphuric acid dissociates, $H_2SO_4 = SO_4^{--} + H + H$. Therefore, $(H^+) \times (H^+) \times (SO_4^{--}) = (H_2SO_4) \times$ constant where the brackets denote concentrations. When $Na_2SO_4$ is added, it also dissociates, giving more $SO_4^{--}$ ions. If equilibrium is to persist, evidently the concentration of H-ions must decrease and the concentration of undissociated sulphuric acid, which does not contribute to the acidity of the solution, will increase.

ard work on this subject—there is a long list of substances which may be used as pH indicators. In Table I (page 182) there is given a selection of indicators which the writers have found most useful and which covers practically the whole range of acidity or alkalinity. The color changes of the indicators marked with an asterisk are depicted in Clark's colored chart of indicators (1920) which is an essential adjunct to every laboratory. The color change of the other indicators are taken with modification from the tables by Salm[2] and by the Eastman Chemical Company. Their range was tested against buffered phosphate and borate solutions.

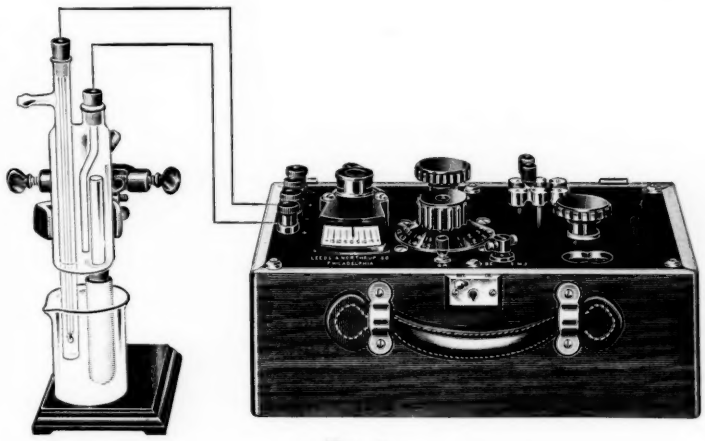

FIG. 2

Where great accuracy is not necessary, mixed indicators may be used which have a wide pH range, for instance, a solution containing:

| | |
|---|---|
| Methyl Red | 0.02 per cent |
| Brom Thymol Blue | 0.04 per cent |
| Thymol Blue | 0.04 per cent |
| Phenolphthalein | 0.04 per cent |

shows the following color change with pH:

| pH | Color |
|---|---|
| 3 | Red |
| 4 | Orange red |
| 5 | Orange yellow |
| 6 | Yellow |
| 7 | Yellow green |
| 8 | Green blue |
| 9 | Blue gray |
| 10 | Blue violet |
| 11 | Violet |

For more alkaline solutions Lizius and Evers[3] recommend the following mixed indicators:

| | |
|---|---|
| I. Phenolthymolphthalein... | phenolphthalein 1 part<br>thymolphthalein 6 parts |
| II. Thymol Violet..... | thymolphthalein 6 parts<br>tropolein 0.1 part |

while E. R. Trotman[4] advises mixtures of

| | | |
|---|---|---|
| III. Di-nitrodiazoaminobenzene | (saturated solution) | 5 c.c. |
| Phenolphthalein | (0.4 per cent) | 0.1 c.c. |

or

IV. Dinitrodiazoaminobenzene solution.. } equal parts
Thymolphthalein solution ..... }

The color changes of the mixed indicators II, III and IV are given as follows:

Color Change—II:

| | |
|---|---|
| pH 8 | — |
| 9 | Y |
| 10 | YG |
| 11 | Bl |
| 12 | BlP |
| 13 | P |

Color Change—III:

| | |
|---|---|
| pH 8 | Y |
| 9 | RY |
| 10 | O |
| 11 | R |
| 12 | RR |
| 13 | — |

Color Change—IV:

| | |
|---|---|
| pH 8 | Y |
| 9 | OR |
| 10 | RP |
| 11 | Bl |
| 12 | — |
| 13 | — |

(Y, yellow; G, green; R, red; Bl, blue; P, purple; O, orange.)

## THE pH OF BUFFER SALTS

We are all acquainted with the fact that some salts, like iron sulphate and tin chloride, have a strongly acid reaction, while others, for instance borax, are alkaline.

These substances are said to be hydrolized (that is, broken down by water) into their acidic and basic constituents. Iron sulphate is hydrolyzed into sulphuric acid, and iron hydroxide and the resulting solution has an acid reaction because the acidic constituent is stronger than the basic.

Buffers, in the more restricted sense, are compounds, in which the acidic, or the basic constituent, or both, are weak, and therefore buffer substances are easily hydrolized. In the absence of other free acids or alkalies, their solutions have a definite hydrogen-ion concentration, which changes but slightly with the concentration of the buffer in solution.

In view of the importance attached to the pH of a

mixture, it seems desirable to have at least an approximate knowledge of its value for solutions of acid and alkaline buffers, commonly used in textile processes.

Unfortunately the available data on this subject are scattered and difficult to find. Moreover, they are expressed in a variety of ways, e. g., in terms of conductivity, per cent hydrolysis, H-ion concentration, or pH, and owing to difference in the method employed the values found by separate investigators often disagree.

In Fig. 5 are brought together some data showing roughly the pH of solutions of several commonly employed chemicals. These graphs can only be considered as a first approximation, but sufficiently accurate for many technical purposes. For instance, a glance will show that trisodium phosphate, contrary to the usually accepted view, is a stronger alkali than soda ash; it should not be used with silk or wool unless modified by the addition of disodium phosphate. The sources from which the information was obtained are as follows:

*Caustic Soda*—NaOH—Curve A from data by A. A. Noyes[5] indicates nearly complete dissociation throughout and therefore a very high alkalinity in concentrated solutions.

*Tri Sodium Phosphate*—$Na_3PO_4$—Curve B, has been obtained by means of indicators (a-naphthol-benzein, Alizarine Yellow R, trinitrobenzol). The point marked (x) is taken from an electrometrical determination by E. Blanc[6]. The pH of a N/10 (tenth normal) solution is given by Salm[2] as 12.6.

*Sodium Silicate*—$Na_2Sio_3$—Curve C, was determined electrometrically by R. H. Bogue[7], Kohlrausch, also Kahlenberg and Lincoln, had previously deduced from conductivity measurements that this substance is almost completely hydrolized at moderate dilution into silicic acid and sodium hydroxide.

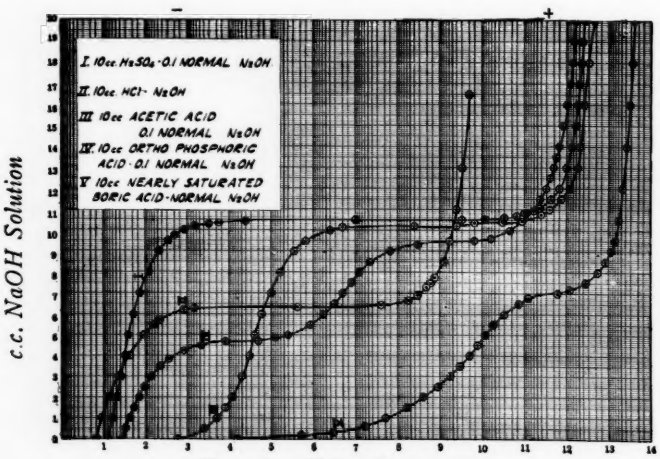
I. 10cc $H_2SO_4$ · 0.1 NORMAL NaOH
II. 10cc HCl · NaOH
III. 10cc ACETIC ACID 0.1 NORMAL NaOH
IV. 10cc ORTHO PHOSPHORIC ACID · 0.1 NORMAL NaOH
V. 10cc NEARLY SATURATED BORIC ACID · NORMAL NaOH
c.c. NaOH Solution
pH or 1oz H-ion Concentration

FIG. 4

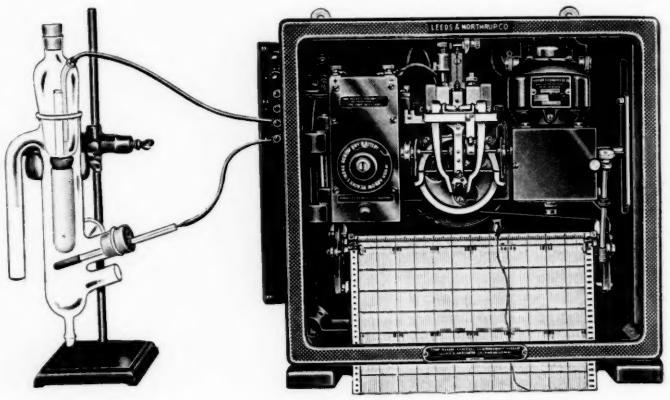

FIG. 3

*Ammonia*—$NH_3$—Curve D, from a table by E. R. Trotman.[1]

*Sodium Carbonate*—$Na_2CO_3$—Curve E, as determined by Menzel[8] with the H-electrode. Curve $E_2$, calculated from the velocity of hydrolysis of ethyl acetate and from the velocity of decomposition of diacetone alcohol[9] shows greater alkalinity.

*Sodium Metaborate*—$NaBO_2$, composed of equivalent amounts of borax and sodium hydroxide, has slightly less alkalinity than soda ash.

Curve F is plotted from electrometrical measurements by Menzel.[8]

*Borax*—$Na_2B_4O_7$—Curve H is from the same source.

*Sodium Oleate*—(Soap) $C_{17}H_{33}CaOH$. Curve G has been determined by means of indicators. It is peculiar in that it shows smaller alkalinity at higher concentrations.

*Di-Sodium Phosphate*—$Na_2HPO_4$—Curve I. Determined by means of indicators.

*Sodium Acetate*—$CH_3COONa$—Curve J. Determined by means of indicators.

*Acid Sodium Phosphate*—$H_2NaPO_4$—Curve K. Determined by means of indicators.

*Alum*—$KAl(SO_4)_2$—Curve L. Determined by means of indicators.

*Ammonium Alum*—$(NH_4Al(SO_4)_2$—Curve M. Determined by means of indicators.

*Acetic Acid*—$CH_3COH$—Curve N is plotted from dissociation values in a table by van't Hoff and Reicher.[10]

*Aluminum Chloride*—$AlCl_3$—and *Aluminum Sulphate* —$Al_2(SO_4)_3$—have about the same acidity, represented by curve O, determined with the H-electrode by Denham[10], H. Ley[12] at 97 deg. Cent., and Brunner[13] at 40 deg. Cent., using the sugar hydrolysis method, found a higher acidity (i. e., lower pH) for $AlCl_3$. Commercial samples, tested by means of indicators, showed higher pH values in the case of the chloride lower pH in the case of the sulphate.

*Tin Chloride*—$SnCl_2$—Curve P has been determined by means of indicators.

*Hydrochloric Acid*—HCl—Curve Q from electrical

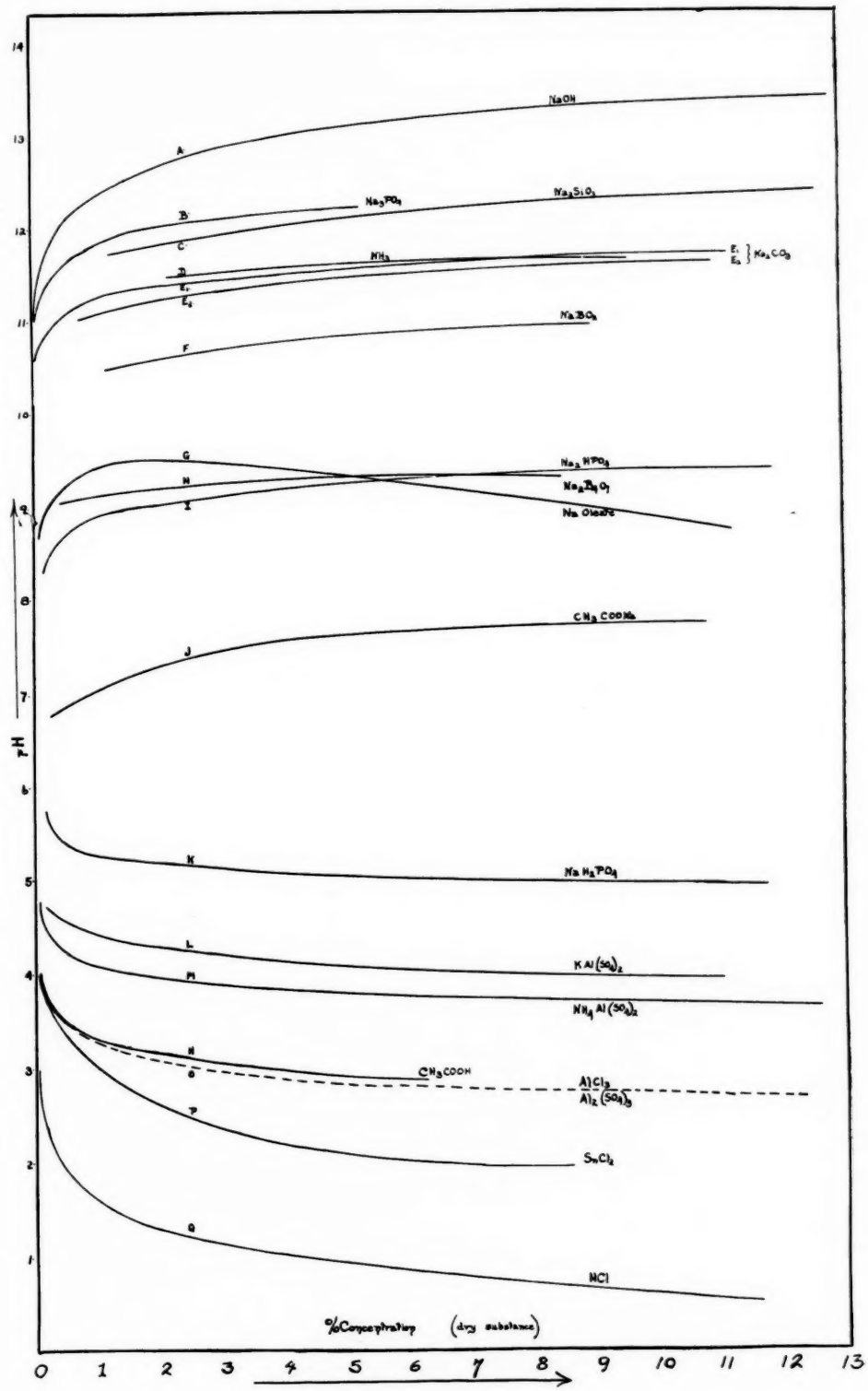
NaOH
A
B
C
D
E1
E2
F
G
H
I
J
K
L
M
N
O
P
Q
Na3PO4
Na2SiO3
NH3
E1 } Na2CO3
E2
NaBO2
Na2HPO4
Na2B4O7
Na Oleate
CH3COONa
NaH2PO4
KAl(SO4)2
NH4Al(SO4)2
CH3COOH
AlCl3
Al2(SO4)3
SnCl2
HCl
pH
% Concentration (dry substance)
0 1 2 3 4 5 6 7 8 9 10 11 12 13
1 2 3 4 5 6 7 8 9 10 11 12 13 14

FIG. 5

conductivity measurements[9] corresponds to a high degree of dissociation.

It should be borne in mind that the pH of a given salt may be greatly modified by the presence of other substances. For instance, by mixing tri-sodium phosphate with phosphoric acid in various proportions buffer mixtures of almost any pH between 3 and 12 can be prepared.

### Examples of Buffer Action in the Textile Industry

The concept of pH and the buffer action have only recently become familiar to investigators in textile technology and there are but few published facts on this topic. These, together with some observations we have made in connection with scouring, will exemplify the wide application and the importance of the new principle.

*Scouring and Degumming.*—Both of these processes depend primarily on the alkalinity (i. e., on the pH) of the solution employed. The greater the pH, up to 12 or 13, the quicker the emulsification and removal of impurities. Therefore, in practice the maximum alkalinity, which will not injure the fibers, is used. Cotton will stand an alkalinity of pH 12 or 13 without being sensibly damaged; the soap solution containing soda used in wool scouring has generally a pH of 10 to 11, while the neutral soap solution used in degumming has a pH of about 9.

Since the alkali is being used up during the process, the solutions employed must contain a reserve of alkalinity in the form of a buffer which will maintain the favorable pH in spite of the alkali which is continuously removed. Soda, soap, borax are such alkaline buffer substances. After prolonged use, a cleaning solution becomes spent either because of the accumulation of dirt or becaust its pH has been considerably reduced. In the latter case the solution can be revived by the careful addition of caustic. A method for determining the pH of the solution is then needed because an excess caustic would be detrimental to the fiber. In the absence of the spent lye, caustic soda may in no instance be used with silk or wool.

Glucose and glycerine sensibly reduce the pH of caustic solutions, probably because they possess slightly acidic properties, and have been recommended for use in degumming. Their buffer action, however, is much less effective than that of soap.

*Bleaching.*—In bleaching with peroxide, Trotman and Trotman[14] find that the best color, together with the least amount of structural change in the fiber, is obtained at a pH of about 10. Weber, in an earlier paper, had advised a pH of 6.8 to 8.4. The acid bleaching by means of sodium bisulphite or permanganate, is no doubt also greatly influenced by the hydrogen ion concentration, but no exact data are available on this point. The use of acetic acid rather than a mineral acid with chloride of lime, evidently indicates that an acidity corresponding to about pH 3 is necessary in that process.

*Dyeing.*—T. R. Briggs and A. W. Bull[15], in a valuable investigation on the process of dyeing, have shown that the amount of dye taken up varies continuously with the change in pH. Wool, for instance, at pH 2, absorbs double the amount of Crocein Orange taken up at pH 5, and three times as much Lake Scarlet.

Reinmuth and Gordon[16] pointed out that the pH of the solution is equally important when dyeing is carried out in the presence of mordants. They came to the conclusion that "a control over the H-ion concentration is a most important factor in the dyeing industry."

The liquor obtained from degumming soap, as Scott[1] remarks, owes its value in dyeing largely to its buffer action.

*The Action of Chemicals on Fibers* is largely determined by the pH of their solution. Thus, arranging the alkaline substances in order of their effect on cotton, we have:

Caustic soda > sodium carbonate > borax > disodium phosphate—which is also the order of their (decreasing) pH.

Similarly organic acids vary in their ac-

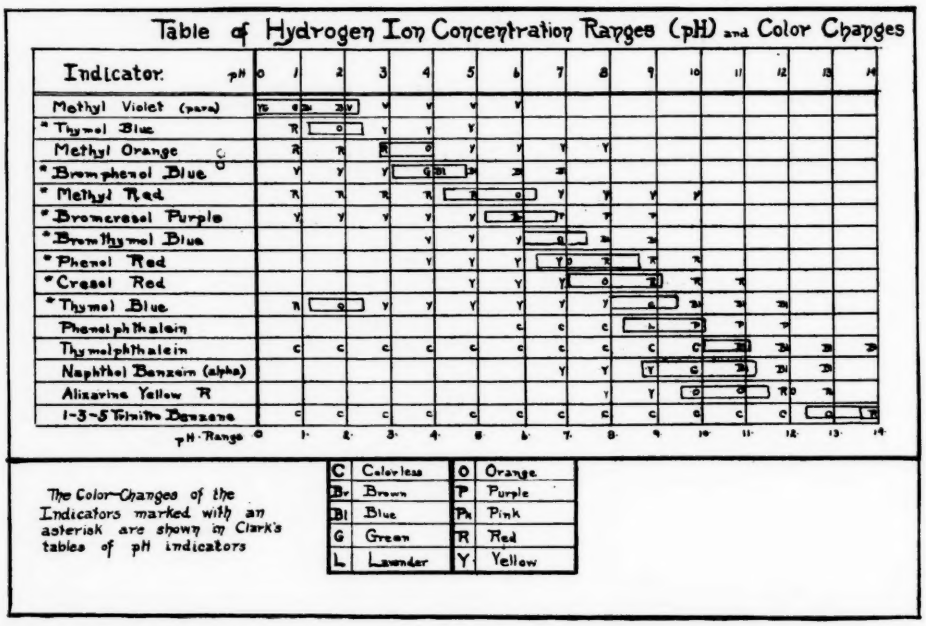


TABLE I

tion on cotton. According to Merritt Mathews[17], at 2 per cent concentration oxalic acid is more harmful than tartaric, which in its turn is more harmful than citric. Here again, it may be readily proved, by adding a few drops of Thymol Blue indicator, that the H-ion concentration of the solution decreases in the same order.

### Summary

Close regulation of acidity or alkalinity in scouring, degumming, bleaching and dyeing is of great value to the textile manufacturer where uniformity in product is essential.

Careful control of processes which require a study of this principle, as well as the correction of such cases where deviations from optimum are noted, can be quickly made.

Simple methods for the determination of pH and a table showing the pH of many of the commonly used chemicals are given.

### BIBLIOGRAPHY

1. H. C. Chapin, Amer. Dyestuff Reporter, Nov. 17, 1924, p. 759; Dec. 28, 1925, p. 859. E. K. Strachan, Amer. Dyestuff Reporter, Vol. 15 (1926), p. 291. W. M. Scott, Amer. Dyestuff Reporter, March, 1925, p. 145; Dec., 1925, p. 864.
2. E. Salm, Zt. Phys. Chem., Vol. 57, p. 480.
3. J. L. Lizius & Evers, Analyst (London), Vol. 47, p. 331 (1922).
4. E. R. Trotman, J. Soc. Dyers & Col., Vol. 42, 209 (1926).
5. A. A. Noyes, Carnegie Inst. Publ.
6. E. Blanc, J. Chimie Physique, Vol. 18, p. 33.
7. Bogue, J. Am. Chem. Soc., Vol. 42, p. 2575.
8 H. Menzel, Zt. Phys. Chem., Vol. 100, p. 299 (1922).
9. J. W. Mellor, Text-Book of Inorganic and Theoretical Chem., Vol. 12, p. 194.
10. J. H. Van't Hoff and L. Th. Reicher, Zt. Phys. Chem. **2,** 779 (1888).
11. H. G. Denham, J. C. S. **93,** 41 (1908).
12. H. Ley, Ber. **30,** p. 2194 (1897). Zt. Phys. Chem. **30,** p. 193 (1899).
13. L. Brunner, Zt. Phys. **32,** 133 (1900).
14. S. R. Trotman and E. R. Trotman, J. Soc. Dyers and Colorists (1926), p. 154.
15. T. R. Briggs and A. W. Bull, J. Phys. Chem. **26,** 845 (1922).
16. O. Reinmuth and Neil E. Gordon, J. Ind. Eng. Chem. **15,** 818 (1923).
17. J. Merritt Mathews, The Textile Fibers, 4th Ed., 1924.
(Our thanks are due to the Leeds & Northrup Company for the loan of cuts for Figs. 2, 3 and 4, and to the Merrimac Chemical Company for several industrial chemicals.

## DYEING AND DYESTUFFS TRADE OF BRADFORD, ENGLAND

The Bradford Dyers' Association, Ltd., employing over 10,000 operatives, was affected by the general strike and the coal strike during 1926 as shown by the reported net profits which were reduced from £716,400 ($3,486,360) in 1925 to £458,949 ($2,233,475) in 1926, a shrinkage of £257,451 ($1,252,885).

The dye-producing concerns in and around Bradford protected by the British dye import license made progress during 1926, improving the fastness of their colors, and developing new dyes for special textile fibers, reducing some prices, according to Consul A. R. Thomson.

Competition with German colors became more difficult and caused some of the smallest manufacturers to resort to mixing and repacking non-competing German dyes.

## Tests for Water and Soap

### Softness of Water—Ammonia and Organic Matter —Purity of Soap—Milling Soaps

ONE of the most important points in textile manufacture is to obtain soft water. It is a great asset to wool scourers, dyers and bleachers. The following data comprise simple methods for testing water for the presence of iron, lime, magnesia, sulphates, ammonia, nitrates and organic matter.

Boil two liters of the water to be tested down to about half in a porcelain dish. When temporary hardness is present in the water, a precipitate will be given, due to the removal of the carbonic acid ($CO_2$) from the bicarbonates of lime, magnesia, etc., or it may be due to calcium sulphate. Iron may also be present in the precipitate. Then filter and wash the precipitate well and examine both filtrate and precipitate thus: Dissolve the precipitate on the filter in the least quantity of pure dilute hydrochloric acid (effervescence shows carbonic acid); treat separate portions as follows:

(a) Add sulphocyanide or ferrocyanide of potassium to test for iron; if iron is present, a red or blue color, respectively, is formed.

(b) Take another portion, boil with ammonia, filter if there is any cloudiness or precipitate, mix the filtrate with oxalate of ammonia in excess and allow to stand; a white precipitate indicates lime as carbonate, sulphate, chloride, etc. Filter off any precipitate and mix the filtrate again with ammonia, and add some phosphate of soda, stir well and allow to stand; a white precipitate, which will be crystalline and perhaps slow in forming, even to the extent of only being visible after standing some considerable time and being left on the sides of the glass when the solution is poured out, indicates magnesium.

Examine the filtrate. Evaporate a fairly large quantity of the filtrate down and add a little ferrous sulphate dissolved in sulphuric acid (conc.). If nitrates are present the solution will immediately acquire a red color where only small quantities are present.

The following are some rapid tests for water analyses: If carbonic acid is present, baryta water turns it turbid; add oxalate of ammonia, and if lime is present the water becomes cloudy.

If barium chloride and hydrochloric acid are added to the water the latter becomes turbid if sulphates are present. Nitrate of silver and nitric acid indicate chlorides if the water shows white cloudiness, and chloride of mercury and carbonate of soda indicate ammonia.

### Test for Ammonia

Acidify a large portion of the water after filtering (to remove suspended matter) with hydrochloric acid and evaporate nearly to dryness; add lime water;

then if ammonia is present it betrays itself by its characteristic odor, and if a glass rod dipped in hydrochloric acid is brought in contact with the solution white fumes appear.

Organic matter is detected by the blackening which occurs when a portion of the water is evaporated to dryness and gently ignited. The precipitate which is formed is at first white, then darkens, and when the organic matter is driven off, returns to a light color again.

### Testing Soaps

Several points have to be considered in testing soaps intended for use in milling woolen goods. The soap should first be subjected to an ordinary chemical analysis. In this it is necessary to determine the amount of water in the soap, the amount of free alkali, unsaponified fat and combined fat, and also the quantity of any adulteration or filling, such as rosin, water-glass, etc., that may be present.

After this, if the first investigation has turned out satisfactory, the spinning tests should be applied. This will show whether the soap is capable of forming a paste having the qualities necessary for milling—i. e., felting purposes.

Five grams of the soap are cut into very thin shavings and dissolved over the water bath in 100 c.c. of water in a beaker. The beaker is then stood in cold water, and the solution, which must be quite free from solid particles, is stirred up with a glass rod until it will draw out into threads. The temperature probably depends upon the fusion points of the fatty acids of the soap, but it is independent of the amount of water in it. Nevertheless, the spinning temperature decreases much faster than the melting points of the fatty acids. A tallow grain soap, the fatty acids of which melted at 43.5 spun at 43 deg. Cent., while a white curd soap, with fatty acids melting at 26 deg., would not spin until the temperature was as low as 4 deg., so that it was inferior as a milling soap.

As regards the use of soaps in the textile industries, the branch which particularly requires a good soap is silk dyeing. Here, free alkali, whether caustic or carbonate, is inadmissible.

### Milling Soaps

The wool trade also requires soap perfectly free from alkali or alkaline salts, except in the production of inferior qualities of goods. A good milling soap must be free from excess either of fat or alkali, must have a great detergent power, and must assist the felting during the milling process.

One of the worst impurities in a milling soap is water-glass. It has a mechanical abrading action on the wool, as well as a corrosive effect on it. If there is much of it, it often coats the fiber and gives the milled cloth a very harsh handle.

Both hard and soft soaps are used for milling. The best fats to use in their manufacture are tallow and palm oil. The standard to be aimed at is a soap consisting solely of pure fatty acid salts of soda or potash. It need hardly be said that a washing powder, or even a powder professing to be pure soap in a ground state, should never be used for milling purposes.—Textile Argus.

---

## IMPORTER CLEARED AND GRANTED REFUND OF DUTY

A decision refunding additional duties levied because of alleged under-valuation, and clearing of charges of fraud the Color Service Corporation, which had entered the refund petition, was handed down recently in the United States Customs Court.

An admirable policy of fairness and leniency is reflected in the text of the decision, which read in part as follows:

"The question arises over an importation of coal-tar preparation from Germany. The importer purchased it but says he couldn't find any evidence of any sales or any opinion except that the price at which he entered was the only price he could get in touch with. He further testified that he received no information from the appraiser. The Government produced no testimony with references to any other price but intimated that they had evidence of sales at a higher price.

"The importer was uncertain as to that, not having his records with him but no steps were taken by the Government to make proof of that fact. At all events the price at which these goods were entered was the nearest price shown to the date of shipment of the goods, which is the date at which the price should be fixed.

"The witness, it appeared to the court, was uncertain and perhaps evasive in some ways but the fact remains that he sold this importation soon after it was entered at the price at which he entered it. Apparently it was sold when he shipped it, although the testimony is not specific on that point. . . .

"However, the case must rest upon the value found by the appraiser but we are of the opinion that there is nothing in the case to show an intent to defraud, bad faith or misrepresentation on the part of the importer."

---

## DYES FOR HOSIERY

Early in 1926 a small factory for the manufacture of hosiery was started in Aguascalientes, Mexico. A variety of colors is used, the initial stock being imported from Germany. January 1, 1927, the output was increased and negotiations begun for the purchase of dyes in the United States.

Further particulars may be secured upon application to the Commercial Intelligence Division, Bureau of Foreign and Domestic Commerce.

# Proceedings of the American Association of Textile Chemists and Colorists

## The American Association of Textile Chemists and Colorists

*President*
LOUIS A. OLNEY
Lowell Textile School, Lowell, Mass.

*Vice-Presidents*
E. H. KILLHEFFER—WALTER S. WILLIAMS

*Secretary*
WALTER E. HADLEY
5 Mountain Avenue, Maplewood, N. J.

*Treasurer*
WINTHROP C. DURFEE
516 Atlantic Avenue, Boston, Mass.

*Councilors*

RALPH F. CULVER
ARTHUR E. HIRST
WILLIAM R. MOORHOUSE
GEORGE A. MORAN
HUGH CHRISTISON
WALTER M. SCOTT

LOCAL SECTIONS AND THEIR OFFICERS

*Northern New England Section—*
Harold W. Leitch, Chairman, Franklin Mills, Franklin, N. H.
A. K. Johnson, Secretary, Lowell Textile School, Lowell, Mass.

*Rhode Island Section—*
John Hutton, Chairman, Glenlyon Print Works, Phillipsdale, R. I.
Albro N. Dana, Secretary, Franklin Process Co., Providence, R. I.

*New York Section—*
Herbert Grandage, Chairman, Clark Thread Co., Newark, N. J.
Daniel P. Knowland, Secretary, Geigy Co. 89 Barclay Street, New York City.

*Philadelphia Section—*
William Ralph MacIntyre, Chairman, Eddystone Print Works, Eddystone, Pa.
Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa.

*Southern Section—*
Leonard S. Little, Chairman, Pacific Mills, Lyman, S. C.
Dyer Moss, Secretary, Newport Chemical Works, Greenville, S. C

*Lowell Textile Junior Section—*
Samuel Meeker, Chairman; Bernhardt Glickman, Secretary.

## THIRTY-SEVENTH RESEARCH COMMITTEE MEETING

The thirty-seventh meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., on Friday, January 14, 1927.

The following members were in attendance: L. A. Olney, E. H. Killheffer, W. S. Williams, W. C. Durfee, W. R. Moorhouse, A. E. Hirst, W. M. Scott, H. W. Hook, G. A. Moran, H. Christison, H. W. Leitch, Wm. Witte, P. F. Ripley, W. D Appel, P. J. Wood and W. E. Hadley.

P. F. Ripley and Wm. Witte, newly appointed members of the Research Committee, and Dr. Washburn of the Bureau of Standards, were in attendance.

Considerable discussion took place relative to the tests which Mr. Appel has been conducting at the Bureau of Standards and which have recently been published. It was pointed out that unless the dyed standards were used in conjunction with these tests, difficulty would be experienced in properly classifying their relative values.

It was felt that we must meet two different conditions, i. e., those of (1) the mill people and converters, and (2) consumers.

It was suggested that dyeings could be made which could be certified by the association, and which could be used for standards of comparison. It was felt that twelve samples would be required for this work, and the following members were appointed to handle this matter:

G. A. Moran, chairman of Committee to Prepare Cotton Standards; H. Christison, chairman of Committee to Prepare Wool Standards; P. F. Ripley, member of Committee to Prepare Wool Standards; W. M. Scott, chairman of Committee to Prepare Silk Standards.

The standards should be produced on a 1-yard piece of cloth and should be dyed a medium shade with a dyestuff which will give a complete exhaustion.

Mr. Appel stated that the actual washing procedure should be based on a strictly reproducible basis, and a special apparatus consisting of glass jars which could be agitated should be used. In standard tests this should be written in the procedure.

A protest was voiced against the use of chlorine solution as used in many laundries, and it was felt that a definite campaign should be inaugurated to drive bleach from laundries.

W. H. Cady, Chairman of the Committee on Fastness to Light, reported progress although he is of the opinion that tentative methods cannot be fully prepared until after the summer of 1927.

A motion was carried that the Research Committee recommend to the Council that they request the Bureau of Standards to publish the report of the Subcommittee on Fastness to Light, whenever that report should be completed, and that a sufficient number of copies be provided so that each member of the association might be supplied with one.

W. E. HADLEY, *Secretary.*

## FORTY-THIRD COUNCIL MEETING

The forty-third Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineers' Club, Boston, Mass., on Friday, January 14, 1927. The following members were in attendance: L. A. Olney, E. H. Killheffer, W. S. Williams, W. C. Durfee, W. R. Moorhouse, A. E. Hirst, W. M. Scott, G. A. Moran, H. Christison, H. W. Leitch and W. E. Hadley.

The following applicants were admitted to membership:

*Active Members*

Albrecht, Chas. H., chemist, Bell Company, Worcester, Mass. Address: 155 Central Street, Auburn, Mass.

Barnes, H. A., superintendent, converting plant, Proximity Print Works, Greensboro, N. C. Address: Denim, N. C.

Coplin, J. E., dyer, Lowe Manufacturing Company. Address: Box 47, Lowell, N. C.

Morris, Merrill G., dyer, Nassau Felt Mills, Brooklyn, N. Y. Address: 16 Grimm Place, Baldwin, N. Y.

Steen, Lambert, colorist, Cramer & King Company. Address: 258 Haledon Avenue, Paterson, N. J.

Stribling, R. S., chemist and fast dyer. Address: Southern Bleachery, Inc., Taylors, S. C.

Wilson, John L., chemist, Zurn Company and Quaker City Chemical Company. Address: Wellington Road, Jenkintown, Pa.

*Junior Members*

Kane, Henry F., laboratory assistant, Pacific Mills. Address: 1A Bennington Street, Lawrence, Mass.

Attention was drawn to the fact that while it was often impossible for chairmen of Local Sections, located far from Boston, to attend the Council meetings, it often happened that some member from those sections would be in Boston at the time of the Council meeting, and it was suggested that such members would be welcome to attend the Council meeting and thus represent the Local Section. The chairmen of the Local Section can appoint, as a representative, any member who will be able to attend.

COMMITTEE ON PRIZE AWARD FOR 1927

The following members were appointed to serve on a Committee for the Award of Prizes for the best papers published in the Proceedings during 1927: W. H. Cady, W. S. Williams, E. H. Killheffer and W. R. Moorhouse.

A motion was made and seconded that all papers to be presented at the Annual Meeting must be offered to the Council for review not later than October 1 preceding the Annual Meeting. It is hoped that this method will permit of a more satisfactory planning of the Annual Meetings, and choice of the papers to be delivered. It was voted to send out a questionnaire during the month of April which will, in part, cover the above matter.

Regarding Corporate Membership, it was the consensus that more publicity should be given to this form of membership, and that if the corporations realized what the Association was doing they would gladly contribute without undue solicitation. The President was authorized to compile material for distribution to prospective corporate members covering the object of the Association, Council Meetings, Research Committee Work, etc. Several suggestions were offered as to what should be embodied in such a prospectus, and each member present was requested to write a letter to President Olney giving their views on this subject and making any suggestions.

It was decided that in the future the Year Book should come off the press around the first of November, which condition would assure that same would be in the hands of each member prior to the Annual Meeting.

W. E. HADLEY, *Secretary.*

## MEETING OF LOWELL JUNIOR SECTION

The first meeting of the Lowell Textile School Junior Section of the American Association of Textile Chemists and Colorists for the season 1926-1927, was held at the school on February 10, 1927. As there was no business to be transacted, Chairman S. Meeker introduced Wm. H. Cady, of the Pacific Mills Print Works, who gave a paper on "Dyeing with Vat Colors."

The paper was highly interesting and enjoyed by all the students and guests attending. It appears below.

The meeting adjourned with a rising vote of thanks to Mr. Cady.

B. GLICKMAN, *Secretary.*

### Dyeing with Vat Colors

By WILLIAM H. CADY
*Pacific Mills Print Works*

Vat dyes may be divided into three classes: Indigoids, Anthraquinones and Carbazols. The indigoids are those which are chemically related to Indigo (although for the most part their application is quite different); they all reduce to a yellow or near-yellow color, require only a small amount of caustic alkali, and may be used on wool and silk as well as on cotton. As a class they are not as fast to light and soap as the anthraquinone vat dyes, but they find extensive application, especially in calico print-

ing. This class includes the Ciba colors, Thio-Indigos, Brom-Indigos, Brilliant-Indigos, and some of the Helindones; also the domestic Sulfanthrenes and Thianthrenes. The anthraquinone vat dyes are those derived from anthraquinone and related products. Of these the Indanthrenes are the best known and possess the best all-around fastness. These dyes differ from the indigoids in requiring considerably more alkaline dye baths, which makes it difficult and frequently impossible to apply them to wool. Silk can be dyed to advantage in some cases, but they are primarily cotton dyes, and are used wherever the most severe requirements as to fastness are met with, including all kinds of wash goods, draperies and colored stripes in gray goods that have to stand bleaching.

Besides the Indanthrene dyes already mentioned, this class includes the Anthra colors, Algols, Cibanones and some of the Helindones; also the domestic Ponsols and Anthrenes. The alizarine Indigos may be considered as belonging to both classes, chemically. The carbazol dyes form a small and relatively less important class. The Hydron Blues, which are intermediate between the Indanthrenes and the Indigos in fastness, are the chief members of this group. In this connection it is of interest to note that in Germany, where the superior fastness of vat dyes is appreciated even more than here, there are retail stores in the cities where only Indanthrene-dyed fabrics are sold; "Indanthrene Stores" they are called, in fact. Here the ultimate consumer may purchase wash fabrics with some assurance that they will actually stand washing. It is well to bear in mind at this point that there is a great difference in fastness between the various vat dyes; some of them are not by any means fast to light, and the fastness to soap and chlorine also shows considerable variation. In other words, "vat dye" is not synonymous with "fast dye."

### General Remarks on Vat Dyes

As a class, they are not easy to dye. They vary in solubility, in the rate of exhaustion, in their sensitiveness to reducing agents, in the temperature required for proper reduction, and in their affinity for the fiber while reduced. Each dye has its own formula. Some require more caustic soda than hydrosulphite, some only half as much; some need salt to drive them on the fiber; at least one has to have glue to keep it from going on too rapidly; some dye best stone cold, while others may be applied almost at the boil. All are insoluble in water in their natural condition, and must be made soluble for dyeing purposes, by treatment with a reducing agent (hydrosulphite) and a caustic alkali. In the reduced state they have affinity for the cotton fiber, and dye it; then on oxidation they become insoluble again, and this is the reason for their extreme fastness to washing. Their affinity for the fiber varies much when reduced; Indigo has practically none, and Indanthrene Red BN has so little that it can be nearly all removed by hot washing. On the other hand, Indanthrene Blue and many others have immense affinity even while reduced.

The oxidation after dyeing must be complete, particularly when the dyeing is done in the vacuum type of machine, from which the air is excluded, such as the Delahunty and Chattanooga raw stock machines and the Franklin yarn machine. For this purpose chrome is ordinarily used, in conjunction with an acid, though perborate is safer. Soaping is usually essential after the goods are dyed, to brighten the shade and in a few cases to increase the fastness. The dye bath must be made up just right; too much alkali will usually hold back the color; too much hydrosulphite may over-reduce the dye so that it will not re-oxidize, and an excess of hydro over caustic will make the bath go acid and precipitate the dye. The heat must be just right. Some dyes require reduction near the boil, some are injured if heated over 140 degrees. Some reduce cold, others fall out of solution if cooled rapidly. The presence of lime or metallic salts in the water tends to precipitate some of the vat dyes, notably the halogenated Indanthrenes.

Altogether, the only safe course for the inexperienced experimenter is to follow literally the instructions furnished by the dye manufacturers. Most dyes are in paste form and very finely divided; this is the most convenient state for quick and complete reduction. The powder brands sometimes are rather water-repellent, and have to be stirred with alcohol or Turkey Red oil before dilution with water. In all cases after the dye has been reduced, it is important to keep it in proper condition. This can be best done by testing the dye bath from time to time with both phenolphthalein paper (to see if it is still alkaline) and with a paper impregnated with Indanthrene Yellow, which will instantly turn blue if the dye bath still contains a sufficient quantity of hydro. Fortunately nearly every dye undergoes a characteristic change of shade when reduced, so that it is easy as a rule to tell by the color of the bath whether the dyes are properly reduced.

### Difficulties in Dyeing

It is hard to get level shades; the colors go on rapidly and cannot readily be stripped, and if the goods are exposed to air during the dyeing, the subsequent oxidation is likely to produce uneven shades, as the parts which were prematurely oxidized will show up darker than the rest. Also vat dyes do not penetrate well; this is partly due to the fact that they dye far below the boil, as a rule, and it is difficult to make any dye penetrate unless it can be boiled. Consequently closely woven fabrics and

tightly twisted yarns are apt to show white places inside; this cannot be avoided.

Another difficulty is that of producing exact matches. A sample taken from the lot of goods being dyed will usually show a somewhat different shade from the whole lot when completed. This is because the shade is to a certain extent influenced by the precise conditions of oxidation and drying. The result is that the dyer cannot be quite sure of his shades, and has to go more or less by guesswork. In addition, a few of the vat dyes change shade according to the moisture content of the air, which does not help matters.

### Cotton Dyeing

This may be on raw stock, yarn in skeins, yarn on packages, warps in the long or short chain, or on the beam, or cloth. The cloth may be dyed in several ways. Raw stock is always dyed in the vacuum type of machine; this is to exclude air, and facilitate penetration. The cotton is tightly and uniformly packed into the machine, and boiling water with a little soda is pumped through it until it is well wet out. The dye is usually reduced in a barrel with the necessary quantities of caustic and hydro, at the proper temperature, and fed into the machine after it is cooled down. If the water is hard, a sufficient amount of soda ash must be added, otherwise the shade will be thin. As a rule, if the dye is properly reduced, it will circulate freely throughout the mass of cotton until it is exhausted, or nearly so; but Indanthrene Violet RR is an exception to this rule, as under ordinary conditions it will not go through the cotton at all, but dyes only the first layer it comes into contact with; this can be obviated by simply adding to the dye bath a little glue, which probably acts by keeping the dye in a more finely divided condition, so that it passes freely through the cotton and dyes it uniformly throughout.

Sometimes the amount of dye that has to be added to the machine is so large that it is not feasible to dissolve it in a barrel before feeding into the machine; in this case it is sometimes permissible to add the unreduced dye to the dye bath, after first dissolving the caustic and hydro. The feeding must be done very slowly. This method has given excellent results in dyeing black with Indanthrene Black B. After dyeing is complete, the cotton is washed in the machine until the wash water is free from caustic. It is then taken out and dried. Cotton yarn on packages and warps on beams receive the same treatment as raw cotton in the main. It is very important to wet out the yarn thoroughly; caustic soda and Turkey Red oil give good results. If the dye has only slight affinity for the cotton while reduced, it will not be safe to wash until the color is oxidized; this can be accomplished by first souring and then treating with perborate, or chrome, or in some cases hypochlorite of soda, followed by bisulphite.

Cotton yarn in skeins is dyed in the ordinary rectangular tanks on wooden sticks. It should be well boiled out and cooled, and left on horses while the bath is being prepared. Put a little soda in first, to correct the water, then the caustic, then the dye, then the hydrosulphite. Stir till reduction is complete, as shown by the color of the solution. In case of shades hard to dye even, put in only one-half of the dye, or less, at the start, and reduce the temperature; the rest is added after a few minutes. It is important to keep the yarn moving in the bath, particularly at the start. Some dyes require the addition of salt to obtain the necessary exhaustion. Dyes like Indanthrene Green B and Indanthrene Dark Blue BO dye best at 180 degrees or so. Helindone Pinks reduce best at 160 degrees or higher, but should be dyed at a lower temperature. After the yarn is dyed, wash in cold water until completely oxidized, then soap at the boil. Dyes which oxidize very slowly are best treated with perborate or chrome. If the yarn is uneven on drying, sometimes a re-handling in caustic and hydro at the somewhat higher temperature will level it considerably.

### Dyeing Mercerized Yarns

A special method recommended for mercerized yarn and for colors which give trouble in dyeing level is as follows: Work the yarn in a bath containing only the dye and "Dekol," which is a dispersing agent, and keeps the dye in an extremely fine state of division in the bath. After one-half hour of this treatment the yarn is lifted and the necessary caustic and hydro are added, and when the dye is reduced, the yarn is re-entered and dyed as usual. Cotton warps are usually dyed doubled several times so that the total length is only 500 yards or so. Dyeing usually takes place in a so-called Scotch tub, in which the warp passes over and under several rolls and through a nip, and is plaited on a truck. About four or six passages through this machine are required to obtain the shade.

The dye is reduced in a barrel as usual, and added to the dye bath during the first two or four ends, in part at the beginning of each run and in part fed on during the run. This is to insure uniformity of shade throughout the warp. If the middle or one end comes up darker than the rest, it is almost impossible to correct it. As the liquor is constantly becoming oxidized by the passage of the warp through it, it is essential to watch closely and add more hydro at the first signs of oxidation. The warp should retain its reduced color until after it has passed through the nip; otherwise it needs more hydro. Warps are sometimes dyed in the long chain also, but this re-

quires much care in feeding, and in keeping the bath properly reduced.

### Cotton Cloth

There are three methods in use: padding, jigging and a combination of the two. Padding is confined to light shades, and to work which does not have to be extremely fast to soaping. The color is reduced in a storage tank with caustic, hydrosulphite and sulphide; the last named is useful in preventing premature oxidation of the liquor. The cloth is padded with this mixture and run on a batching roll. Then it is taken to a rope soaper, and soaped until all the loose color is removed. Some shades come down 25 or 50 per cent during this treatment. A better way is to take the cloth from the pad and put it on a jig and work it in a warm solution of caustic and hydro; this re-reduces the color and gives it a chance to dye the fibers properly.

All vat dyes require an appreciable time in contact with the fiber in a reduced state, in order to dye it properly and be fast. The pad does not give them this opportunity, as it is too rapid. A still better method is the so-called pad-jig method; this differs from the one just described in that the color is padded in the reduced state; just the dye and a little thickening, such as gum arabic. The cloth is best dried at this stage, and is put on a jig and run in a bath of caustic and hydro, in which the dye gradually reduces, and as it does so, it immediately attaches itself to the fiber, and on subsequent oxidation it possesses a high degree of fastness to washing. This process is widely used for light and medium shades, and gives excellent results as regards fastness, penetration and levelness. For heavy shades the jig alone is quite adequate, and considerably more economical. The color is usually strained into the jig through a cloth, to eliminate insoluble particles, and is reduced as usual in the jig itself, the dyeing taking place in about six ends. Whichever method is used, it is always wise to end up with a rope soaping. There is another method for cotton cloth which is theoretically possible but seems to be difficult of execution; still I believe it is feasible. That is to pad the color with hydrosulphite-formaldehyde, just as in printing, and steam it. Here is an opportunity for experiment which might prove well worth while, as if successful it would permit of tremendous production, combined with excellent fastness.

Rayon (viscose, or any other of the regenerated celluloses) is dyed by the same general methods as cotton, and usually in the skein. On account of its great affinity for vat dyes, more precautions are needed. The dye bath contains glue or Dekol as dispersing agent, Turkey Red oil, the usual caustic and hydro, and sometimes also hydrosulphite-formaldehyde, probably to help keep the bath reduced. The color is reduced outside the bath, and is added in several portions. Still better, the yarn is worked in the bath awhile before the reduced color is added, to get the air out of it.

### Vat Dyes on Wool

Wool may be dyed with the Indigoid vat dyes, after a fashion, but the anthraquinones are not adapted to wool dyeing, because they require so much caustic to put them in solution that the fiber is in danger of being attacked. Several methods have been proposed for dyeing the Indigoids on wool, all of which are based on the idea of keeping the percentage of free caustic at the minimum. In one, the vat is made in the usual way, the same as for cotton; then lactic acid is added until the alkalinity is reduced below the danger point. An addition of Protectol is also of advantage. Other organic acids may be used instead of lactic. In another formula, the dye is reduced as usual, and glue, ammonia, and later ammonium sulphate are added to the dye bath. Under these conditions the dye is said to exhaust. This method is recommended for loose wool. In still another recipe, bicarbonate of soda is added until most of the caustic is converted into carbonate. This has to be done very carefully.

It is interesting to note that a special series of vat dyes for wool is now on the market, which are practically soluble in water without the addition of caustic. The dye bath is made up by adding ammonia, blue and hydro, and then straining in the dye, previously stirred in water. The wool is dyed at 120 degrees, squeezed, oxidized in the air, and washed. This process is best adapted to loose wool and yarn. It is interesting to recall that before the war the U. S. Government was using a combination of vat dyes to produce an olive drab shade on loose wool for Army uniforms.

### Indigo

We now come to Indigo, the oldest vat dye of all, and still by far the most important as regards total consumption, although far from being the fastest. Indigo has been used all through the ages. It was probably first dyed in India, the home of the Indigo plant, and spread gradually into other countries. Marco Polo, returning from one of his journeys to the East, brought back the first authentic accounts of Indigo dyeing, about 1,300 A. D., but it was not until two centuries later that the dye began to be imported into Europe in quantity. Here it competed with woad, a native product, which also contains Indigo as its active principle, though it is not nearly so good; and the rivalry between these two coloring matters became most bitter. In order to protect the home

product, dyers in England were forbidden to use Indigo, and those who disobeyed were severely punished. This prohibition seems to have been about as effective as the 18th Amendment, for the dyers continued to use Indigo on the quiet, and took their chances with the law. Not until the end of the 18th century was the ban removed from Indigo.

The Indigo of the past, as you all doubtless know, was obtained principally from a plant grown in India. It came on the market in the form of hard blocks of dried dye, containing varying quantities of indigotin, the active principle. Bengal Indigo, probably the best, ran as high as 60 or 70 per cent. Before using this natural product it was necessary to grind it to powder. The synthesis of Indigo was a problem that occupied the brightest German chemists for many years before it was finally solved, and synthetic Indigo made its appearance about 1897. The Germans, realizing the advantages of a product that would not require grinding and that would always be of the same strength, put on the market a paste of 20 per cent strength. While at first dyers were reluctant to adopt any substitute for the product they had always used, and were suspicious of all "imitations," gradually they were converted owing to the various advantages of the paste product, as well as its greater economy, and now outside of England and the countries which have a financial interest in the natural Indigo crop, the synthetic product has captured practically the entire market.

### The Fermentation Vat

The old-time method of applying Indigo and probably the oldest known dyeing process, was the fermentation vat. While this had many variations, it consisted essentially of three things: the Indigo, the alkali and nascent hydrogen, generated by the fermentation of certain organic substances rich in starch and sugars. A typical formula for the fermentation vat for wool is as follows:

40 pounds Indigo paste
100 pounds woad
20 pounds bran
20 pounds madder
10 pounds soda ash
6 pounds quicklime

The principle of this type of vat is that the woad, bran and madder undergo fermentation, liberating hydrogen gas, which reduces Indigo to Indigo White. The Indigo White in turn is dissolved by the alkali, and in this soluble form it is taken up by the wool later. Woad is used because in addition to its possessing Indigo itself, it is a valuable fermentative agent. After the various ingredients are mixed at 140 degrees and stirred, the mass is allowed to stand. Fermentation begins in about twelve hours. From this time on, the vat has to be frequently "sharpened" with lime to prevent the fermentation from going too far. Too much lime will stop the fermentation altogether, while too little will permit the escape of free hydrogen gas, and eventually the vat may be completely ruined. The dyer must watch the liquor carefully, almost continuously, and his experience tells him how much lime to use. The vat goes gradually greener and turns finally yellow, covered by a dark bluish flurry. When the liquor is in condition for dyeing and the insoluble matters have settled to the bottom, a net is suspended in the vat, and the wool to be dyed is entered and poled for about one-half hour. The net prevents the wool from sinking to the bottom of the vat and becoming contaminated by the thick sediment. At the end of the dyeing period the net is lifted from the vat and the wool spread out to oxidize. Later the operation is repeated, and the shade gradually built up by successive dips until the desired depth is obtained.

### Hydrosulphite

The one thing which next to the synthesis of Indigo itself has contributed most to the spread of Indigo dyeing was the discovery of hydrosulphite about 1900. This product, made by the reduction of sodium bisulphite by zinc powder, and marketed as a dry powder, is an ideal reducing agent for Indigo, as well as for all other vat dyes, as it is easy to handle, inexpensive, and makes a vat which requires little supervision. The hydrosulphite vats to-day are of the utmost importance. While they have not yet displaced the fermentation vat completely in wool dyeing, they are preferred in many places on account of the ease with which they can be kept in condition, and (particularly the hydrosulphite-soda and hydrosulphite-ammonia vats) because there is no sediment, and consequently the vats may be made shallower and no time is lost in waiting for the sediment to settle.

The hydro-soda vat is worked as follows: a stock vat, separate from the dye vat, is made by stirring together Indigo paste, caustic soda, and hydro at 150 deg. Fahr. The Indigo is reduced to a clear reddish yellow solution. The dye vat is heated to 140 degrees, ammonia and a little hydro added, also glue, and finally the stock vat. The dye vat should be a greenish yellow color and must be only weakly alkaline (turning phenolphthalein paper pink, not red), as an excess of alkali would injure the wool. The hydro-ammonia vat differs from the hydro-soda vat in that a special form of Indigo is used, Indigo Solution 20 per cent, which is a ready reduced Indigo white containing no free caustic, and capable of forming a vat by the simple addition of ammonia and hydro. This type of Indigo is a little more expensive than the ordinary sort, but it does away with the danger of free caus-

tic. The vat is prepared by simply mixing the Indigo solution with glue and adding to a vat containing a little ammonia and hydro. Both of these vats are worked in the same manner: the loose wool is entered and poled for one-half hour, then removed and passed through squeeze rolls to remove the surplus liquor. After it is completely oxidized it is dipped again, and finally washed with water.

Indigo on cotton is not essentially different from Indigo on wool, except that there is no danger of an excess of caustic. The favorite vat is the hydro-soda, which is made in practically the same manner as that for wool, but contains much more caustic soda. The fermentation vat for cotton had been extensively used in the past, but is practically obsolete now except in Oriental countries. The favorite application of Indigo to cotton is on piece goods, which are usually dyed by being passed continuously through about four vats, with a brief "skying" or exposure to air after each immersion, in order to oxidize the color. The strength of the vat has to be maintained by frequent additions of reduced dye, as well as hydro. Cotton warps are also extensively dyed with Indigo, usually by several passages through a single vat, oxidizing after each passage. The long chain system is used.

## The Erio Chrome Colors*

By Daniel P. Knowland
*Geigy Company*

When asked to write a paper on the Erio Chrome colors of the Geigy Company, the thought naturally comes to my mind: Will everyone believe as I do as to what constitutes a fast color? Light is not necessarily the only fastness requirement.

There was a time when ladies' dress goods was the only light colored material on the market. By that I mean only ladies wore light fawns, plums, orchids, etc.; but now men wear the loudest sports suits, containing colors that are next to impossible to imitate with chrome colors. Nevertheless, we are asked to get fulling fastness of shade as well as light for such colors as Patent Blues, Acid Violets, and, in fact, almost every combination in the spectra. This can be done to a limited extent, where the pattern does not require too much of this bright color, but when any great amount is required, we, and no doubt the dyers in general, hold up our hands in holy horror.

Therefore I am going to slide rather quickly over the modes of the day and colors required, and try to give you as briefly as possible a resumé of the Erio Chrome colors in general, dwelling in a few instances on a fastness to light and fulling color, showing how we try to satisfy the more esthetic, and imitating some of the shades and sports wear in general seen roaming around our numerous golf and country clubs.

*Paper presented at the meeting of the Rhode Island Section of the American Association of Textile Chemists and Colorists, Providence, R. I., January 21.

### Light Fastness

Fastness to light is, of course, very essential, and so also is fulling fastness, as the loom fabric has to be made into cloth which appears well. When a golfer has worn the finish off his new suit he is not as careful with it, and oftentimes if an enthusiast wipes his hands on his trousers, or if he has been cleaning clubs, or if his hands are all wet from damp sand, or if he roams through bushes and mud-holes in search of lost balls, more than ordinary procuring fastness is required. All of these operations taken into consideration show what a piece of cloth goes through from the country club to the rag-man, and it is necessary for us to consider what colors are to be used for each particular requirement. With your kind indulgence, I will try to explain each of the different classes, and from time to time name a few special colors which we recommend as having been tried and tested, and as being in general use to-day.

When the fastness requirements are necessary in all branches of wool dyeing, the chrome colors are naturally to be desired. Of course, we all know there are some acid colors faster to light. These colors, however, do not stand the vigorous treatment that a fine piece of woolen or worsted cloth goes through before it becomes a salable article. Neither do these fast acid colors stand the wear which men give to their suitings and overcoats; therefore I believe it is not exaggeration when I say chrome colors should be used in all branches where fast colors are required.

All of the Erio Chrome Yellows can be dyed by the top chrome, bottom chrome and eriochromal methods. They are considered remarkably fast to milling, level well, and are used in fast wool, dyeing either alone or in combination. Of course, there are times when special properties are desired and then we change the brands according to the requirement; for example: in the dyeing of silk white effects, we recommend the Erio Chrome Yellow S Brands. As a general rule the greenest shades are the least fast to metal, particularly iron. However, this has been greatly overcome by dyeing with the eriochromal method.

If exceptional fastness is required, such as to light, potting or milling, we then recommend our Erio Chrome Flavine A Conc. This yellow has exceptional fastness in these respects and we should not overlook its excellent fastness to potting, shrinking, fulling against white wool, cotton and silk, carbonizing, crocking and street dust. Erio Chrome Orange R is good to light; not quite as good to fulling as Erio

Chrome Phosphine R and 2R, and in solubility the two latter products are more to be desired.

### The Eriochrome Reds

For white silk effects, we prefer the Erio Chrome Phosphine R and 2R. These two products dye remarkably level, and are excellent for mixtures in piece goods, cotton effects, remaining very white indeed.

However, for the phosphines we do not recommend a hard boil. With chrome colors one does not have to use the amount of orange as when dyeing acid colors, as our range of browns and olives is so extensive. Erio Chrome Red G is one of the fastest of chrome reds, has excellent solubility, levels well, is very fast to milling and steaming, fast to carbonizing, alkalies (street dust), shrinking, potting and light. Erio Chrome Red G can be dyed by all methods—i. e., top, bottom and eriochromal—and when dyeing piece goods containing silk white effects, the silk remains remarkably clean. Like all good things Erio Chrome Red G is more costly, and for a cheaper red with excellent properties we recommend Erio Chrome PE and Erio Chrome Red PEI. These colors have good solubility, level very well, and leave silk unstained in piece dyeing; and are only a little inferior to the G and B brands to milling and potting. These reds in particular have the best fastness to metals.

Erio Chrome Red B is probably the best known of all the Chrome Reds. It is somewhat of the bluish cast, has excellent solubility, levels easily and can be used for the most delicate shades; has good fastness to fulling, carbonizing and cross dyeing. When dyed on a chrome bottom, the shade comes up much fuller without any of its fastness properties being impaired. It gives the well-known Indigo test and can be used for a bottom under Indigo.

Among the darker reds are Erio Chrome Bordeaux G and B. Both have good fastness to milling. The G brand is somewhat better to light. It can also be dyed eriochromal. Erio Chrome Geranol R, a self-color, is a very bright Chrome purple; has excellent fastness to milling and potting and is of great assistance in raw stock dyeing, as a small amount will give the desired effect when trying to raise brightness of a mixed fabric such as a heather.

Erio Chrome Green L is my choice of the greens, because of its level dyeing qualities. It has the decided advantage of holding its shade under artificial light, which makes this a very useful color when dyeing browns and will correct the redness appearing under artificial light. When dyed on a chrome bottom, this color is faster to light and the shade is somewhat bluer than when dyed top chrome. Erio Chrome Green L is also an exceptionally fine color for the eriochromal method.

Erio Chrome Green H finds its chief use in dyeing piece goods containing white silk effects, as they remain absolutely white. Erio Chrome Verdon S is the fastest to light of all Chrome Greens as well as exceptionally fast to rubbing, fulling, potting and perspiration. This color can be top-chromed, or dyed by the eriochromal method. The bath should be started with the addition of Acetate of Ammonia.

Among the Greens should also be classified Eriochromal Grey G and 5G. These two colors level well, and have good fastness to light. Both dye top-chrome or eriochromal, and silk effects are left very clean. They also have the advantage of not changing under artificial light. Erio Chrome Azurol B needs no introduction as it is without doubt the most outstanding chrome blue that has ever been marketed. It is a pure blue in shade, both in daylight and lamp light, and tinctorially strong; can be dyed top chrome, eriochromal and chrome bottom method and is not in the least affected by metals. When dyed in light shades its fastness to light is moderate; but in combination with Erio Chrome Blueblack B and Erio Chrome Red B, navy blues are produced that have brilliancy and the best fastness to fulling alongside white silk. Erio Chrome Azurol B should be boiled well in the after chrome bath to insure the best level dyeing.

### The Blue S Brands

Mention might be made at this time also of the Erio Chrome Blue S Brands, which are very popular in Europe and to some extent in this country. They are: Erio Chrome S, Erio Chrome Blue SB, Erio Chrome Blue SR, and Erio Chrome Blue SBP. They level well and have excellent fastness to light, milling, potting and rubbing; and in combination with Erio Chrome Blueblack B produce very beautiful navy blues. These blues can also be dyed with sulphuric acid. This quality should be appreciated by those who dye on carbonized material or shoddy. The SR and SB brands are the best under artificial light.

Erio Chrome Blue BR is a deep blue and an excellent substitute for Indigo Blues for uniform cloth giving the same Indigo spot with nitric acid. Erio Chrome Indigo B and R are very similar colors and somewhat faster to fulling. Among the Violets are Erio Chrome Violet B, 3B and 4B. These colors all level well and are very fast to light and fulling. Erio Chrome Violet B dyes both top and bottom chrome, while the 3B dyes best by the eriochromal method.

Silk effects are left clean in medium shades. Erio Chrome Violet 4B is the bluest of the violets. Although not available since the great war it was extensively used in piece dyeing, the silk white effects remaining absolutely clean.

The latest addition to our violets, Erio Chrome Brilliant Violet B Supra, is of the bluish cast, on the shade of Acid Violet 4BN, but is not quite as brilliant. However, it is faster to light and has excellent fastness to fulling. Like Erio Chrome Azurole, Erio Chrome Geranol and Erio Chrome Cyanine, it has very little color before chroming and should be boiled well in the chroming bath. This color can be dyed by all three methods.

Erio Chrome Brown ST, R, V, M, SDE all level well, and have good fastness to light. The ST brand is the best under artificial light and should be dyed after chrome, whereas the others can be dyed on a chrome mordant. Erio Chrome Brown SDE and V leave silk effects clean and the R brand fairly so. Erio Chromal Brown G is the fastest to light of the Chrome Browns as well as the most pleasing shade as it will dye from a light fawn to the seal brown without changing under artificial light. We recommend this color as best dyed by the eriochromal method. It can also be used for yarn and stock as well as piece goods, and is fast to fulling, potting, etc.

### The Eriochrome Blacks

The discovery of the Erio Chrome Blacks and Erio Chrome Blueblacks is one of the outstanding achievements of synthetic dye chemistry as the shade and fastness will more than answer the requirements necessary for a piece of cloth going through from the loom to the selling agent. Erio Chrome Blueblack B is the fastest Chrome Blueblack known. It is fast to light even in very light shades, as well as having excellent fastness to milling, potting, rubbing, steaming, etc. The fastest results are produced by the afterchrome method. This color can be dyed on a chrome bottom as well as eriochromal when using oxalate of chrome. It is an excellent base for navies. The baths should be acid from the start. Erio Chrome Blueblack R is a cheap base for navy blues. This color can be started either acid or neutral, and has excellent fastness to milling and light, but slightly inferior to potting. Erio Chrome Black T is today the most popular of all Chrome Blacks, of unsurpassed fastness to light, potting, milling, perspiration, shrinking, etc. This color should be started warm and with the acid in the dyebath at the beginning, or the acid can be previously dissolved with the dyestuff. Other colors of this same potting class series are the PPB Conc and PS Conc, only somewhat bluer in shade.

Erio Chrome Black A is also an exceptionally fast black with the same all-round fastness as the T brand and is extensively used on yarn, stock, slubbing and piece goods. Its chief use, however, is for vigoreaux printing. Erio Chrome Black M is very similar, only somewhat bluer in shade. Erio Chrome Black X and DF are similar colors with excellent fastness but less fastness to potting than the blacks previously mentioned. These blacks are not affected by metals.

It might be well to mention that our Erio Chrome Blacks require only a small amount of chrome to develop the shade, and a comparatively short time for dyeing. Erio Chrome Black E is used chiefly on piece goods, either top chrome or by the eriochromal method, silk effects remaining clean. When dyed by the latter process it is not sensitive to metals.

This now completes the general line of Erio Chrome colors. There are a few that have not been mentioned, being used for special purposes only.

A class I would like to mention before closing, although not chrome colors, can be dyed by any of the three methods with good fastness to milling and light —the Polar colors.

This line is rich in bright reds, yellows and oranges and offers very good colors for decorating threads which cannot be obtained with the regular chrome colors. These colors as well as the Erio Chrome colors can be highly recommended for the bathing suit trade in general where particularly fast colors are to be desired for salt water.

---

## Applicants for Membership

*Active Membership*

Bogert, Dr. Marsten T., professor of Organic Chemistry, Columbia University, New York, N. Y. Sponsors: L. A. Olney and W. E. Hadley.

Clark, Ormand W., fast color dyer, Bellman Brook Bleachery, Fairview, N. J. Sponsors: H. B. Sturtevant and E. R. Borho.

Gates, Walter S., general manager, Great Lakes Thread & Yarn Company, Detroit, Mich. Sponsors: J. G. Stott, Jr., and W. E. Mitchell.

McDowell, Benson, superintendent and dyer, Lewisburg Mills, Lewisburg, Pa. Sponsors: H. E. Tillson and B. Kendall Archer.

*Junior Membership*

Choquette, Paul J., chemist, Pacific Mills, Lawrence, Mass. Sponsors: Wm. H. Cady and J. M. Hood.

Fleming, J. F., Jr., student, Georgia School of Technology, Atlanta, Ga. Sponsors: C. A. Jones and J. J. Sokolinski.

McLean, Earle R., student, Lowell Textile School, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

Spedding, Fred, apprentice dyer, Wood Worsted Mills, Lawrence, Mass. Sponsors: F. E. Johnson and L. A. Olney.

Springer, Sidney, student, Bradford Durfee Textile School, Fall River, Mass. J. Worton and A. Nelson Alderman.

---

## Changes of Address

Sauerbrey, W. A., 808 Bronx River Road, Yonkers, N. Y.

Prescott, Walker F., 625 Champagneur, Montreal, Can.


### ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

**WALTER E. HADLEY,**
**5 Mountain Avenue,**
**Maplewood, N. J.**

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

LOUIS A. OLNEY
PROFESSOR OF CHEMISTRY AND DYEING, LOWELL TEXTILE SCHOOL
Directing Editor

CLAYTON HOAGLAND
Managing Editor

MYRON DREW REESER
Advertising Manager

Published biweekly by
HOWES PUBLISHING CO., INC.
90 William Street, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year: Canadian $5.50; foreign $6.00

Vol. XVI March 21, 1927 No. 5

## WATCH THE DYERS AND CLEANERS

THE day is coming when textile mills must follow more standardized methods of making and processing fabrics. That day may be just around the corner. We will know it has arrived when mills change their manufacturing processes to meet more closely the demands of the consuming trades. Signs of this approaching change can be seen in the activities of certain textile trade groups who are in close touch with the consumers. One such group is the dyeing and cleaning industry.

Organized into the National Association of Dyers and Cleaners, the members of this enterprising trade are rapidly extending the study of their craft to include a knowledge of fabric manufacture, as well as of cleaning and dyeing. They are now evolving standards of practice based on *facts* about textiles, about shrinkage and finish and weighting, and about dyes and dyeing as performed in the mill.

The whole-hearted way in which the dyers and cleaners have planned their research program was revealed to those who attended their annual convention at Indianapolis last January. They have made a study of new fabrics, new combinations of material, new colors and processes, and they are co-operating with allied trades. The Laundryowners' Association sent a man to their annual convention. The director of the Good Housekeeping Institute spoke there on dry cleaning from the viewpoint of the consumer. The relation of the dyers and cleaners to the mills on one hand and to the retailers and consumers on the other was discussed, and in this way was developed the idea of closer co-operation between all these various groups.

Meanwhile, at the Bureau of Standards in Washington, these dyers and cleaners have research associates who are solving dry-cleaning problems that touch intimately the interests of both the mill and the consumer. Some of their technical reports, notably one on the effects of cleaning on silk, have been published as part of the movement urging more uniform methods of textile manufacture.

Not far from the Bureau of Standards where the dry cleaners' research chemists are working, a building is under construction that in a few months will be the home of the Dyers' and Cleaners' Research Institute. Here hundreds of men will be trained to carry on the trade and craft of dyeing and cleaning, and in its fine new laboratories the research work will be continued on a more ambitious scale. These dyers and cleaners aspire to be textile experts.

In discussing their problems they lay particular stress on the idea that damage to dry-cleaned garments can generally be traced to some defect in their manufacture. By taking this stand, which should not be regarded as unfair or narrow, they have drawn into co-operation with them the retailers. The president of the National Association of Dyers and Cleaners, speaking last month before the convention of the Retail Dry Goods Association, declared:

> The merchant and dry cleaner have much in common. Neither has control over conditions in fabrics or apparel for which the public holds him responsible, and this unfortunate condition within our lines of trade costs each of us millions of dollars every year. . . . Whatever happens to a garment at the dry cleaner's is a responsibility of all parties clear back to all sources of creation.

Some of the responsibility for damaged goods is thus dropped at the door of the mill. But this is not a case of "passing the buck." The dyers and cleaners are not simply making bare assertions against the textile manufacturers to cover up improper cleaning methods. They are going after the technical facts about cleaning and mill processing methods, and are learning how dry cleaning should be done and why some fabrics do not stand up under the proper methods. In other words, they seem to be after the truth, and if some of their findings do not please the mills it *might* mean that mill practice should be changed.

Said President Heinze to the retailers:

> The finisher at the mill says that he is powerless to stave off the demand to overweight silk and otherwise adulterate quality and, in the same breath, alibis that he cannot be expected to know what use the fabric will be put to in consumption. And thus we could guess what each branch of the textile industry would say in answer to a finger of guilt pointed at the particular group engaged therein; and their replies would be soundly founded in their own behalf.
>
> For the structure of the future we should ally in planning co-operative contact with the sources of fabric manufacture . . . for the purpose of stopping at the sources without loss to anybody this hundred and more million dollar loss to the public.

Only fabrics designed for satisfactory wear should be distributed to the American people.

This officer of the Dyers' and Cleaners' Association said further that he should like to see testing bureaus in principal garment buying centers to which buyers would send fabrics and garments for rating. "The obligation is upon the merchant and dry cleaner and laundryowner," he said, "to make known to those producing clothing fabrics what the public can wear with serviceable satisfaction."

This is the reason why we say that the day is coming when mills must change their processes to meet the demands made by cleaners and launderers, who have studied textiles and are therefore qualified to dictate requirements. It is a challenge that cannot be ignored by the mills, nor by those who make dyes. Those two interests are being invited to co-operate more closely in making and applying colors and finishes that will stand up under an accepted standard practice of cleaning and laundering.

This means that in dyeing in the mill for fastness and "cleanability," the element of doubt must be removed; the dyer must be able to say to the cleaning trade: "This fabric will meet your requirements; it can safely be cleaned or redyed by your standard methods." To be able to say this the mill man must be well informed regarding all that the dyers and cleaners discover about shrinkage and fastness, and those other technical details of fabric manufacture. The research activities of the dyers and cleaners should be carefully watched.

But is it not evident that the cleaners have approached this problem from the right direction? They did not start with the mill; that would only have caused further complication. They were in touch with the public first, and consequently learned what is required in a fabric to make it "wear with serviceable satisfaction." They are now learning why some fabrics do not have that needed quality. When they have reached a point in their research where their knowledge will enable them to lay down more specific standards of cleaning practice, they will present the results to the mills. "This," they will say, "is what a fabric must have; this is how it should be made." They will be able to speak in this manner because they will have studied textiles and will know the requirements of those who wear them.

When that day comes will the mills be able to satisfy these demands? They will be if they have kept abreast of the dyers and cleaners by co-operating with them and by pursuing their own research and evolving *their* standard practice of manufacture.

---

The National Oil Products Company is now represented in Southern territory by Herbert Booth, who has recently become affiliated with this company's sales department. Mr. Booth, who is well known in the textile trade, has had a number of years of experience in marketing textile chemical specialties.

## MARKETING CHEMICAL SPECIALTIES ABROAD

There exists a growing tendency on the part of American firms to export chemical specialties, packed in small containers ready for sale to ultimate consumers. Some American firms have met with considerable success in certain foreign markets, but find it almost impossible to enter others where they are confronted with such keen local competition as to make it virtually impossible to affect sales in large quantities, unless the basic prices thereof are fixed low enough to afford ample consideration of high local duties and heavy carriage charges. In view of the present state of those markets having high tariffs, and the extent of local manufacture, the prospects for future sales of competitive American products are limited. While the establishment of a foreign packing or manufacturing depot is not essential for entering most markets, there seems to be a consensus of opinion among the local dealers in certain markets that a good demand for chemical specialties would be possible if manufactured locally in direct competition with similar locally-produced commodities. In this way many American firms, whose sales in considerable volume would otherwise be impossible, have found it practicable to defeat heavy tariffs and eliminate large carriage charges necessary in shipments from abroad and have acquired a remarkably good local reputation. Indeed, it is surprising to observe in some countries how the local public will patronize such an industry despite the fact that, in effect, it is really a foreign concern operating on local soil. The opportunity which it affords for the investment of local capital, employment of local labor and the improvement of local industry seems to be sufficient to assure the success of such a venture.

Many firms now engaged in manufacturing or packing abroad find it advantageous to supply most of the bulk raw materials from their usual American sources, thereby insuring a finished product that is of the same quality as produced in the American plant. By so doing, high grade finished products can be marketed successfully in markets that would, of necessity, be impossible to impregnate.

---

## INDIGO CROP OF MADRAS PRESIDENCY SMALLER

The Department of Agriculture reports that the area planted with Indigo in the Madras Presidency up to the end of November, 1926, is estimated at 54,600 acres, against 77,100 acres one year ago.

The reduction is due to the competition of synthetic Indigo.

No information is available about the quantity actually manufactured into dye or cut and ploughed into the land as manure. The use as manure is on the increase, especially in the Carnatic and Central Districts, reports Consul Montgomery of Madras.

If the whole crop were made into dye the possible yield would be about 1,467,884 pounds.

# The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER, *90 William Street, New York City.*]

## PROBLEMS STRANGE AND VARIOUS

By HANG-DO

ON the shelves of our laboratory are a number of books of interest to the textile chemist and necessary to his work if he is to answer all of the questions put to him as well as being an aid to general knowledge. For instance, we have Matthews' "Textile Fibres" and "Application of Dyes," as well as books on cloth analysis, fabric finishing, sizing, soaps and oils. We refer to these texts very often for information. One instance of their usefulness was when the "boss" asked for a report on a condition of two shipments of tops. His curiosity had been aroused because the invoice showed a conditioned weight and a weight based on a regain on which the price was based.

### WHEN REGAIN MEANT LOSS

I procured the invoices, studied them and then looked up the subject as dealt with by Matthews. Not being a textile school graduate this book saved my dignity and subsequently money for the company. To begin with, we did not have a conditioning oven, but another concern near us did have one, the use of which we were allowed. I procured representative samples from several bales of tops, making sure the bales had maintained their invoiced weights. Luckily there had been no change, which eliminated one factor in arriving at a true analysis. Carefully putting my samples in air-tight jars I took them to the conditioning oven. It was of the gas-heated type with a single large basket and balance attached. After about two days' work I succeeded in arriving at the bone dry weight of the sample. Following are the results arrived at, which were submitted to the "boss":

LOT 1452

| Weights as billed: | Pounds |
|---|---|
| Original unconditioned weight | 3,690 |
| Loss by moisture (9.1 per cent) | 336 |
| Dry weight | 3,354 |
| Regain (15 per cent) | 503 |
| Invoiced weight | 3,857 |

Weights arrived at as reconditioned in our laboratory:

| | Pounds |
|---|---|
| Charged weight | 3,857 |
| Loss by moisture (16.44 per cent) | 634 |
| Regain (15 per cent) | 483 |
| Corrected weight for invoice | 3,706 |
| Excess of invoiced weight above correction | 151 |

LOT 1451

| Weights as billed: | Pounds |
|---|---|
| Original unconditioned weight | 1,982 |
| Loss by moisture (8.8 per cent) | 174 |
| Dry weight | 1,808 |
| Regain (15 per cent) | 271 |
| Invoice weight | 2,079 |

Weights arrived at as reconditioned in our laboratory:

| | Pounds |
|---|---|
| Invoiced weight | 2,079 |
| Loss by moisture (16.26 per cent) | 336 |
| Dry weight | 1,743 |
| Regain (15 per cent) | 261 |
| Corrected weight for invoice | 2,004 |

The "boss" didn't understand "regain" then and, for that matter, doesn't as yet. Suffice to say, that he submitted my figures to the seller of the tops. Meeting me in the mill one day about a week later he smiled and stopped me, saying, "We received a check for two hundred dollars in the morning mail as an adjustment on the tops you tested." That was good pay for two days' work.

### A LITTLE PROBLEM IN ENGINEERING

A chemist can be an engineer sometimes and to prove it I offer this experience:

Before I entered my employers' service they had erected a cement tank forty feet in height and with a capacity of 40,000 gallons. It was built by a reliable firm but on a rather questionable foundation. At any rate, when first filled the bottom dropped out and partially flooded the mill. The construction company poured a new bottom in the tank and it held for about a year before it again began to leak. Another new bottom was poured with the same result. This tank being a part of the plant of which I was in charge, I asked to be allowed to put a bottom in as I believed it should be done. Permission was granted me, although the engineer who had built the tank said that my plan would not be to any advantage. I went ahead, nevertheless.

To begin with, the bottom of the tank was saucer-shaped, and always broke away at the edge of the wall and settled, never cracking crosswise. Two men were put to work drilling holes around the edge of the tank. These holes were drilled about two inches above the bot-

tom and at about a 20-degree angle downward and five inches deep. They are spaced about eight inches apart and in pairs; that is, two were always opposite each other. Thus, if a straight line were to be drawn from one hole to its mate, all such lines would have been parallel. Running at right angles to these lines we had other lines crossing from holes on the other two sides of the tank. This made a perfect net-work of eight-inch squares in the bottom of the tank.

Figuring out the exact distance between each hole we ordered three-eighth-inch reinforcing irons of specified lengths. By bending these rods into an arc we could put their ends into the holes for which the rods were meant. The rods were then bent downward in the center to within three inches of the old bottom. We soon had a net-work of iron in the bottom of the tank. Most of the intersections were wired together. Since the holes had been drilled downward at a 20-degree angle and the rods bent down to conform to the saucer bottom, the ends of the rods were hooked in the walls of the tank. On this we poured concrete. That was about six years ago and I am glad to say we have had no further trouble.

### Queer Stains

One of the most annoying problems I was forced to solve several years ago was that of a stain on blankets. These stains were of a light yellowish-brown and could not be removed; even strong acids (though, of course, not practical) would not efface them. They were causing serious losses so something had to be done. I traced the blankets from one department to another, but there was never a sign of them until they came from the sulphur bleach house and had been rinsed and extracted. Sometimes the stains wouldn't be in evidence for days at a time and then suddenly they would appear.

One day I was called to the wash house to look at some blankets as they were being inspected preparatory to leaving for the dry room. The old bug-bear was again in sight. After carefully inspecting some of the spots I came upon one that told the story in plain language. The spot was about as big as a hand, but there were several perfectly white dots about one-eighth of an inch in diameter scattered regularly throughout the spot itself.

It was the extractor baskets. I had long suspected them, but while precautions had been taken to prevent their direct contact with the blankets by using cloths, the evidence was there. Evidently somebody had omitted that cloth, but just the same the baskets were to blame. The cloths had become acidified by contact with the blankets, and gradually the bronze baskets had stained them. The stain was in time strong enough to stain the blankets. We corrected this by shellacking the baskets as occasion demanded, which was once or twice a month. As a further precaution we used new cloths, and, though that was three years ago, no further stains have bothered us.

These are not the only stains we have had trouble with, but they were the only ones that never could be removed. Later on we hope to be able to tell you about other stains and how they were overcome.

---

## NEW VAT AND PRINTING RED AMONG DU PONT COLORS

A new vat color now being manufactured in this country for the first time has been developed by the research laboratories of E. I. du Pont de Nemours & Co, and placed on the market under the name of Ponsol Red AFF. The dyestuffs department of this company has also announced the production of a new printing paste, Pontacyl Red 4R and a new brand of Sulphur Black, Sulfogene Carbon HXX.

Ponsol Red AFF can be used for full shades of bright bluish red or for rose and pink shades on either cotton or silk. It is described as dyeing extremely level and as requiring no addition of any retarding agents. As it is claimed to require only a small amount of caustic soda, it is recommended particularly for dyeing silk and rayon, and is used extensively on these fibers. Its shades are said to be fast to boil-off and bleach with hydrogen peroxide, and to have excellent general fastness, being particularly good to washing, alkali, acids, cross-dyeing, chlorine and other agents, to which its use would be subjected. It can be used on practically all types of machines, according to the announcement, as the shade is unaffected by copper, iron or Monel metal.

The printing color, Pontacyl Red 4R, is described as giving shades of great brilliancy, being standardized in a very high concentration to make it suitable for this purpose. It does not precipitate in printing pastes, it is further claimed, nor gelatinize, and should prove of special interest to carpet manufacturers.

This color is also said to be suitable for dyeing woolen yarns and piece goods, being described as of good solubility and level dyeing properties. It can be used in combination with other Pontacyl colors and also for machine dyeing. It is claimed to be very fast to acids and rubbing, and to have good fastness to water, steaming, ammonia ironing and perspiration. Its fastness to light is also described as very good. It can be used for silk printing in dyeing where acid reds are desired for this purpose and where fastness to washing is not required.

The new type of Sulphur Black, marketed under the name of Sulfogene Carbon HXX, is a highly concentrated brand described as of pleasing shade and good solubility. According to the description of its properties it does not float on water, wets out readily and does not dust, keeping strength and shade in a standing bath.

---

The offices of the American Aniline & Extract Company, of Philadelphia, are located in new quarters at 111 North Front Street, and its warehouses at 136 North Water Street.

# Dyes Imported Through New York and Other Ports During February

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

## KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

### 1—THE SIX LEADING GERMAN COMPANIES

IG—Interessen-Gemeinschaft der Farbenindustrie.
A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

### 2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg, near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
Seig.—G. Seigle Corporation, Stuttgart.
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

### 3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887

### 4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

### 5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

IMPORTS of coal-tar dyes reached a total in February approximately 59 per cent higher than that recorded for the previous month. The February poundage of imports was 312,277, with an invoice value of $262,364. Imports by ports were as follows: New York, 298,919 pounds, valued at $248,168; Boston, 13,358 pounds, valued at $14,196. Tables giving detailed statistics of February dyestuff imports follow:

### Imports of Synthetic Dyes

| | Pounds | Invoice Value |
|---|---|---|
| 1926— | | |
| January | 300,441 | $283,635 |
| February | 369,045 | 377,638 |
| Total, two months | 669,486 | $661,273 |
| 1927— | | |
| January | 196,620 | 186,387 |
| February | 312,277 | 262,364 |
| Total, two months | 508,897 | $448,751 |

### Dyes and Intermediates Remaining in Bonded Customs Warehouse

| | Dyes and Colors (pounds) | Intermediates (pounds) |
|---|---|---|
| July 31, 1926 | 512,186 | 781,796 |
| August 31, 1926 | 557,852 | 690,031 |
| September 30, 1926 | 395,535 | 590,520 |
| October 31, 1926 | 281,320 | 557,257 |
| November 30, 1926 | 303,321 | 539,561 |
| December 31, 1926 | 360,488 | 562,536 |

### Per Cent of Dyes by Country of Shipment

| | 1927 | |
|---|---|---|
| | Feb. | Jan. |
| Germany | 49.5 | 37.0 |
| Switzerland | 33.9 | 34.0 |
| Belgium | 4.9 | 11.0 |
| England | 4.6 | 7.0 |
| France | 1.3 | 7.0 |
| Italy | 0.3 | 3.0 |
| Canada | 5.3 | 1.0 |
| Holland | 0.2 | .. |

**Five Leading Dyes, by Quantity, Imported During February**

| | Pounds |
|---|---|
| Helindone Printing Black RD Paste | 25,000 |
| Rhodamine B Extra (single strength) | 13,200 |
| Ciba Red R Paste | 12,566 |
| Cibanone Orange R (single strength) | 8,876 |
| Vat Olive R (single strength) | 8,705 |

The dyes in this report are grouped by both Colour Index and Schultz numbers, and, in the case of those which could not be identified by either number, the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

## DYES OF COAL-TAR ORIGIN

| Colour Index No. | Schultz No. | Name of Dye and Mfr. | Quantity (pounds) |
|---|---|---|---|
| 16 | 137 | Hensa Yellow 10G Paste—(IG) | 1,000 |
| 32 | 182 | Brilliant Sulphon Red 10B—(S) | 1,000 |
| 70 | — | Rapid Fast Red GL Paste—(IG) | 2,000 |
| 289 | 257 | Cloth Fast Blue B—(I) | 550 |
| 316 | 273 | Diazamine Blue BR Conc.—(S) | 4,739 |
| 324 | — | Diazo Brilliant Orange GR Extra—(By) | 430 |
| 346 | 296 | Cotton Yellow G Extra—(IG) | 100 |
| 349 | — | Chlorantine Fast Yellow 4GL—(I) | 1,874 |
| 420 | 344 | Universal Dark Brown C—(IG) | 50 |
| 448 | 363 | Cotton Red 4BX—(IG) | 500 |
| 449 | 364 | Diazo Brilliant Black B—(IG) | 2,000 |
| 561 | 449 | Trisulphon Brown B Conc.—(S) | 5,000 |
| 577 | 457 | Trisulphon Brown GG Conc.—(S) | 3,000 |
| 639 | 22 | Zylene Light Yellow 2G—(S) | 1,000 |
| 645 | — | Kiton Fast Yellow 3G—(I) | 551 |
| 663 | 500 | Setopaline Conc.—(G) | 220 |
| 671 | 506 | Erioglaucine Supra Conc.—(G) | |
| | | Erioglaucine EP—(G) | 1,212 |
| 677 | 512 | Diamond Magenta I—(IG) | 25 |
| 682 | 518 | Ethyl Violet—(IG) | 1,000 |
| 700 | 532 | Alkali Violet A Extra Conc.—(IG) | 50 |
| 704 | 536 | Alkali Blue 2B Conc.—(IG) | 1,000 |
| 714 | 545 | Kiton Blue A—(I). | |
| | | Poseidon Blue BR Extra—(IG) | |
| | | Poseidon Blue BR Conc.—(IG) | 2,110 |
| 715 | 546 | Blue FF Powder—(C) | |
| | | Cyanol FF Powder—(C) | |
| | | Zylene Cyanol FF Extra—(S) | 1,330 |
| 717 | 548 | Acid Violet 6BNOO—(IG) | 600 |
| 718 | 549 | Brilliant Chrome Violet 4B—(DH) | 220 |
| 729 | 559 | Victoria Pure Blue BO—(IG) | 1,600 |
| 735 | 564 | Alkali Fast Green 3G—(IG) | |
| | | Kiton Fast Green V—(I) | 1,602 |
| 737 | 566 | Wool Green S Conc.—(I) | 381 |
| 749 | 573 | Rhodamine B Extra (s. s.)—(I) | |
| | | Rhodamine B Extra (s. s.)—(Q) | 13,200 |
| 762 | — | Chromorhodine BN—(DH) | 441 |
| 789 | — | Brilliant Phosphine 5G—(I) | 551 |
| 793 | 606 | Phosphine 3R—(IG) | 1,128 |
| 815 | 618 | Tannoflavine T—(S) | 1,000 |
| 828 | 672 | Azocarmine GX—(IG) | 300 |
| 833 | — | Wool Fast Blue BL—(IG) | |
| | | Wool Fast Blue GL—(IG) | |
| | | Xylene Milling Blue BL—(S) | |
| | | Xylene Milling Blue GL—(S) | 4,330 |
| 842 | 680 | Methylene Violet 3RA Extra—(IG) | 250 |
| 851 | 690 | Diphene Blue B—(IG) | 500 |
| 865 | 700 | Nigrosine T—(IG) | |
| | | Silver Gray P—(IG) | 250 |
| 875 | 923 | Fur Brown NZ, NZD, P, 4R—(IG) | |
| | | Fur Gray ALA, B—(IG) | |
| | | Fur Olive DA—(IG) | |
| | | Fur Nako B, D, DFN, DG, ER, 3GA, 4G—(IG) | |
| | | Fur P, R, RHG, 3R, 3RSC—(IG) | |
| | | Fur Black C, DD—(IG) | |
| | | Fur Red O—(IG) | 1,420 |
| 879 | — | Chromazurine E, G—(DH) | 882 |
| 892 | 635 | Modern Violet—(DH) | 651 |
| 899 | 640 | Modern Azurine 5G—(DH) | 55 |
| 905 | 645 | Gallazine No. 90—(DH) | 551 |
| 913 | 653 | Danubia Blue BX—(IG) | 250 |
| 924 | 660 | Methylene Green G Extra—(I) | 220 |
| 927 | 663 | New Methylene Blue N—(IG) | 250 |
| 1006 | 746 | Thional Brilliant Green GG Conc.—(S) | 705 |
| 1019 | 774 | Alizarine Black S Paste—(IG) | 452 |
| 1033 | 779 | Alizarine Orange A Paste—(IG) | |
| | | Alizarine Orange AO Paste—(BD) | 3,658 |
| 1034 | 780 | Alizarine Red IWS—(M) | |
| | | Alizarine Red S—(IG) | |
| | | Alizarine Red WS—(S) | 1,461 |
| 1035 | 782 | Anthracene Brown SW Powder—(IG) | 400 |
| 1040 | 784 | Alizarine Red SX Paste—(IG) | 2,198 |
| 1053 | — | Alizarine Light Blue SE Conc.—(S) | |
| | | Alizarine Sapphire Blue SE—(I) | 1,220 |
| 1054 | 858 | Alizarine Light Blue B—(S) | 5,000 |
| 1064 | — | Alizarine Cyclamine R Paste—(IG) | 1,704 |
| 1067 | 804 | Alizarine Blue S Powder—(IG) | 875 |
| 1075 | 856 | Alizarine Blue AS Powder—(By) | 668 |
| 1084 | 854 | Alizarine Viridine FF Paste—(IG) | 3,176 |
| 1085 | 862 | Alizarine Blue Black B Powder—(IG) | |
| | | Chrome Blue Black B Powder—(I) | 2,543 |
| 1088 | 855 | Alizarine Blue SKY Powder—(By) | |
| | | Alizarine Sky Blue B—(IG) | 2,006 |
| 1091 | — | Alizarine Rubine R Powder—(By) | 220 |
| 1095 | 759 | Anthra Yellow GC Paste—(B) | |
| | | Anthra Yellow GC Powder (s. s.)—(B) | 1,540 |
| 1097 | 761 | Vat Orange RRT Paste—(IG) | 1,008 |
| 1104 | 767 | Vat Brilliant Violet RR Paste Fine—(IG) | 459 |
| 1106 | 838 | Vat Blue RSP Triple Powder (s. s.)—(IG) | 1,800 |
| 1113 | 842 | Vat Blue GCD Dbl. Pst. Fine (s. s.)—(IG) | |
| | | Vat Blue GCDN Powder (s. s.)—(IG) | 3,232 |
| 1114 | — | Vat Blue BCD Paste Fine—(B) | 957 |
| 1115 | 843 | Cibranone Blue G Powder—(I) | 661 |
| 1116 | 847 | Vat Green BB Powder (s. s.)—(IG) | 2,400 |
| 1136 | 822 | Vat Orange RRK Paste—(By) | 400 |
| 1150 | 833 | Vat Olive R Paste—(IG) | |
| | | Vat Olive R Powder (s. s.)—(IG) | 8,705 |
| 1151 | — | Vat Brown R Paste—(IG) | |
| | | Vat Brown R Powder (s. s.)—(IG) | 8,241 |
| 1152 | — | Vat Brown G Powder (s. s.)—(By) | 1,320 |
| 1162 | 831 | Vat Red RK Paste Fine—(B) | 1,422 |
| 1163 | 832 | Vat Violet BN Powder (s. s.)—(IG) | 400 |
| 1169 | 792 | Cibanone Orange R Powder (s. s.)—(I) | 8,876 |
| 1173 | 793 | Cibanone Blue 3G Paste—(I) | 4,290 |
| 1184 | 881 | Brilliant Indigo 4B Paste Fine—(IG) | |
| | | Brilliant Indigo 4B Powder (s. s.)—(IG) | 11,701 |
| 1190 | 885 | Brilliant Indigo B Paste Fine—(IG) | |
| | | Brilliant Indigo B Paste—(IG) | 7,581 |
| 1196 | 890 | Ciba Yellow G Paste—(I) | 771 |
| 1207 | 912 | Anthra Red B Paste Fine—(IG) | |
| | | Ciba Pink B Paste—(I) | 1,395 |

| Colour Index No. | Schultz No. | Name of Dye and Mfr. | Quantity (pounds) |
|---|---|---|---|
| 1211 | 910 | Helindone Pink AN Powder (s. s.)—(IG) | 250 |
| 1212 | 918 | Thioindigo Red 3B Paste—(IG) Vat Red Violet RH Paste Fine—(IG) | 2,941 |
| 1217 | 913 | Helindone Orange R Paste—(IG) | 500 |
| 1218 | 915 | Vat Scarlet R Paste—(IG) | 300 |
| 1219 | 920 | Vat Violet 2B Paste—(Q) | 979 |
| 1222 | 901 | Ciba Violet B Powder (s. s.)—(I) | 5,510 |
| 1227 | 904 | Vat (Helindone) Brown G Powder (s. s.)—(M) | 1,190 |
| 1228 | 907 | Anthra Scarlet 2G Paste—(B) Ciba Scarlet G Extra Paste—(I) | 6,942 |
| 1229 | 908 | Ciba Red R Paste—(I) | 12,566 |

## UNIDENTIFIED DYES

### Acid Dyes

| Name of Dye and Manufacturer | Quantity (pounds) |
|---|---|
| Acid Brown RN—(G) | 110 |
| Acid Milling Yellow G Conc.—(S) | 1,000 |
| Acid Violet 3R—(IG) | 25 |
| Azo Fast Blue BD—(IG) | 50 |
| Brilliant Milling Blue B—(IG) | 1,000 |
| Brilliant Wool Blue FFR Extra—(IG) | |
| Brilliant Wool Blue FFR Extra—(By) | 984 |
| Cloth Fast Orange G—(I) | 220 |
| Cloth Fast Yellow G—(I) | 551 |
| Guinea Fast Green B—(IG) | 500 |
| Kiton Fast Red 4BL—(I) | 1,323 |
| Lanasol Blue R—(I) | 440 |
| Lanasol Violet R—(I) | 220 |
| Milling Red 4BA—(IG) | 200 |
| Milling Yellow O—(IG) | 1,000 |
| Pilatus Fast Green BL Conc.—(IG) | 300 |
| Polar Yellow 5G Conc.—(G) | 551 |
| Sulphon Orange G—(IG) | 500 |
| Sulphon Yellow 5G—(IG) | 350 |
| Supramine Bordeaux B—(IG) | 200 |
| Supramine Brown G—(IG) | 300 |
| Supramine Brown R—(IG) | 100 |
| Supramine Red B—(IG) | 300 |
| Supramine Yellow R—(IG) | 389 |
| Zylene Fast Blue FF Conc.—(S) | 300 |

### Vat Dyes

| | |
|---|---|
| Anthra Orange RH Paste Fine—(IG) | 500 |
| Anthra Pink B Extra Paste—(IG) | 1,500 |
| Anthra Scarlet B Paste—(IG) | 500 |
| Ciba Pink BG Powder (s. s.)—(I) | 5,510 |
| Ciba Violet BL—(I) | 110 |
| Cibanone Green GC Powder—(I) | 110 |
| Eridan Brilliant Scarlet B—(IG) | 500 |
| Helindone Printing Black RD Paste—(IG) | 25,000 |
| Hydron Pink FF Paste—(IG) | 4,000 |
| Hydron Scarlet 3B Powder (s. s.)—(C) | 990 |
| Indigosol Pink HR Extra—(DH) | 55 |
| Vat Blue RSN Powder—(IG) | 50 |
| Vat Blue RZ Double Paste (s. s.)—(IG) | 1,000 |
| Vat Blue Green B Double Paste (s. s.)—(IG) | 1,010 |
| Vat Brilliant Blue R Paste Fine—(IG) | 964 |
| Vat Gray RRH Powder (s. s.)—(IG) | 150 |

### Color-Lake Dyes

| | |
|---|---|
| Brillianton Orange R Powder—(IG) | 100 |
| Hansa Yellow GSA—(IG) | 1,000 |
| Lake Yellow G Powder——(IG) | 143 |
| All other dyes—(Q) | 3 |

## A LIST OF APPRAISEMENTS OF COAL-TAR PRODUCTS WITHIN PARAGRAPHS 27 AND 28 OF THE TARIFF ACT OF 1922

The following supplemental list contains the month of entry, the name of the product within paragraphs 27 and 28, together with the designations as "C" (for competitive) and "NC" (for non-competitive), which indicates the appraisement basis for the assessment of the ad valorem duty in paragraphs 27 and 28 of the Tariff Act of 1922.

The ad valorem rate for competitive dyes is based on the American selling price, as defined in Subdivision (f) of Section 402 of Title IV; the ad valorem rate for non-competitive dyes is based on the United States value, as defined in Subdivision (d) of Section 402 of Title IV of the Tariff Act of 1922.

This list contains the appraisements received since the publication of the January list for the Port of New York, beginning with January, 1926.

### FEBRUARY, 1926

| | |
|---|---|
| Alizarine Red S Powder | C |
| Alizarine Sky Blue B Powder | NC |
| Brilliant Milling Blue B Powder | NC |

### MARCH, 1926

| | |
|---|---|
| Acid Alizarine Black R 85% | NC |
| Acid Anthracene Brown PG 65% | NC |
| Acid Anthracene Brown PO 65% | NC |
| Acid Milling Red R Conc. 666, 65% | C |
| Acid Ponceau E 640, 55% | NC |
| Alizarine VI Extra Pure 20% | C |
| Alizarine Rubinole 3G Powder 50% | NC |
| Alkali Fast Green 3G 30% | C |
| Alkali Fast Green 10G 50% | NC |
| Anthracene Blue SWGG Extra Powder 80% | NC |
| Anthraquinone Blue Green BXO 100% | NC |
| Auracine G Formiate 390, 86% | NC |
| Benzo Fast Blue 8GL 50% | NC |
| Benzo Fast Copper Blue R 100% | NC |
| Blue NBB 70% | C |
| Brilliant Wool Blue B Extra 30% | NC |
| Chromal Blue CC for Printing 939, 90% | NC |
| Chrome Azurol S Conc. 1004, 80% | NC |
| Diamine Catechine G 65% | C |
| Diamine Orange B 41% | NC |
| Diamine Rose GD 40% | C |
| Diamine Sky Blue FF 32% | C |
| Diamine Yellow N Powder 90% | NC |
| Diazo Sky Blue 3G 50% | NC |
| Eriochrome Blue Black G 925, 70% | NC |
| Eriochrome Flavine A Conc. 1015, 45% | C |
| Eriochrome Violet B 918, 70% | NC |
| Eriochrome Yellow C Paste 946, 20% | C |
| Erioglaucine AP 545, 80% | C |
| Erioglaucine X High Conc. 570, 90% | NC |
| Fast Red Salt 3GL | NC |
| Helindone Fast Scarlet C Paste 17% | NC |
| Hydron Blue G Powder 65% | C |
| Hydron Violet RF Paste High Conc. 18% | NC |
| Methylene Blue 3G 44% | NC |
| Para Black V 65% | NC |
| Para Brilliant Orange G 50% | NC |
| Para Brown GK 50% | NC |
| Para Brown RK 45% | NC |
| Para Brown V Extra 50% | NC |
| Polar Red G Conc. 596, 70% | NC |
| Rapid Fast Red CK Paste 12½% | NC |
| Rhoduline Sky Blue 3G Conc. 100% | NC |

| | |
|---|---|
| Rhoduline Sky Blue 3G, 40% | NC |
| Sorrel Red X 100% | C |
| Supramine Red 2G 70% | NC |
| Vat Blue RSN Powder 80% | C |
| Vat Brilliant Violet RK Paste 12½% | NC |
| Vat Yellow 3GF Double Paste Fine 25% | NC |

**APRIL, 1926**

| | |
|---|---|
| Alizarine Blue JR Powder | NC |
| Chrome Pure Blue B Powder | NC |
| Diaminogene Blue GG Powder | NC |
| Indocyanine B Powder | NC |
| Vat Dark Blue BOA Paste Fine 15% | C |

**MAY, 1926**

| | |
|---|---|
| Erio Glaucine AP 545, 80% | C |
| Guinea Fast Red BL | C |
| Methyl Silk Blue New 706, 90% | NC |
| Polar Red R Conc. 597, 65% | NC |
| Polyphenyl Blue GC 103, 65% | C |
| Setoglaucine 753, 55% | NC |

**JUNE, 1926**

| | |
|---|---|
| Diphenyl Catechine C Supra 337, 80% | NC |
| Diphenyl Fast Brown GNC 129, 55% | NC |
| Eosin Azur | NC |
| Erio Cyanine AC 503, 75% | C |
| Gentian Violet | NC |
| Indigo Carmine | C |
| Methylene Blue Pure | NC |
| Neutral Red | NC |
| Romanowsky Stain | NC |
| Vat Rose AN Paste | NC |
| Vat Rose BN Paste | NC |

**JULY, 1926**

| | |
|---|---|
| Developed Brilliant Green 3G | NC |
| Developed Brilliant Orange 5GX | NC |
| Diaminogene GG | NC |
| Direct Gray R Paste 1022, 20% | NC |
| Formal Fast Black C Conc. 280, 60% | NC |
| Methylene Green W 748, 64% | C |
| Rhodamine B Conc. 762, 100% | C |
| Setacyl Direct Blue G Powder 781, 10% | NC |
| Vat Printing Brown R Paste | NC |
| Vat Red 2B Powder | NC |

**AUGUST, 1926**

| | |
|---|---|
| Alizarine Light Gray BS Conc. | C |
| Masic Pink C Powder | NC |
| Diaminogene CC | NC |
| Diaminogene Blue GC Powder | NC |

**SEPTEMBER, 1926**

| | |
|---|---|
| Anthra Scarlet 2G Powder | NC |
| Chloramine Brilliant Red 8B Conc. | NC |
| Indocyanine B | NC |
| Metachrome Olive Brown G Powder 20% | NC |
| Methylene Green W 748, 64% | C |
| Permanent Yellow G 16052 | NC |
| Piperidine Piperidyl Dithio Carbamate | NC |
| Pyrazol Orange R Conc. | C |
| Rosinduline 2B Bluish | NC |
| Vat Printing Brown R Paste | NC |

**OCTOBER, 1926**

| | |
|---|---|
| Acid Green Conc. | C |
| Acridine Flavine R | NC |
| Alizarine Blue AS | NC |
| Alizarine Blue Sky | NC |
| Alizarine Direct Red 3G | NC |
| Anthra Scarlet 2G Paste | C |
| Brilliant Acridine Orange R Conc. | NC |
| Brilliant Sulphon Red 10B | NC |
| Chloramine Red 3B | C |
| Erica B Conc. | C |
| Rosalane Paste | NC |
| Xantho Phosphine G 300% | NC |
| Xylene Brilliant Blue FFBX Conc. | NC |

**NOVEMBER, 1926**

| | |
|---|---|
| Chloramine Fast Orange R Conc. | C |
| Chloramine Red B | C |
| Metachrome Olive Brown C Powder 20% | C |
| Metachrome Olive Brown G Powder 20% | NC |
| Neolan Blue BR 38% | NC |
| Neolan Blue GR 36% | NC |
| Omega Chrome Brown EB | C |
| Pyrazol Orange G Conc. | C |
| Romanowsky Stain | NC |
| Stain Leaf Green 33.8% | NC |
| Tannoflavine T | C |
| Trisulphon Brown B Conc. | C |
| Xylene Blue VS Conc. | C |
| Xylene Light Yellow 2G | C |

**DECEMBER, 1926**

| | |
|---|---|
| Alizarine Light Violet BS Conc. | NC |
| Aurine | NC |
| Bismarck Brown Pure | NC |
| Rosin Methylene Blue | NC |
| Lemon Yellow Stain | NC |
| Methyl Violet | NC |
| Romanowsky Stain | NC |
| Tanno Flavine T | C |
| Toison Blood Fluid | NC |

**JANUARY, 1927 ..**

| | |
|---|---|
| 6 Soloid M/S Romanowsky Stain 0.015 gm. (Wright's Mod.) | NC |

## OTHER COAL-TAR CHEMICALS

**JUNE, 1926**

| | |
|---|---|
| Beta Naphthol Compound | C |
| Colchichine Salicylate | C |
| Epinine | C |
| Fluorescein | C |
| Homatropine Hydrochloride | C |
| Hydroquinone Developer | NC |
| Methanamine and Methylene Blue | C |
| Methylene Blue | C |
| Physostigmine Salicylate | C |
| Quinine Salicylate | C |
| Salol | C |
| Sodium Salicylate and Potassium Bicarbonate | C |

**AUGUST, 1926**

| | |
|---|---|
| Hertolan | NC |

**OCTOBER, 1926**

| | |
|---|---|
| Benzyl Benzoate Pure | C |
| Cinnamic Aldehyde | C |
| Methylanthranilic Acid Methylester | C |
| Phenyl Glycol Valerate | C |
| Piperidine Piperidyl Dithio Carbamate | NC |
| Toluol-sulpho-monomethylamino-dimethyl-phenyl pyrazolon | NC |

**NOVEMBER, 1926**

| | |
|---|---|
| Cinnamic Aldehyde | C |
| Epinine | C |
| Fluorescein | C |
| Homatropine Hydrochloride | C |
| Iso Butyl Benzoate | C |
| Iso Butyl Phenylacetate | C |
| Iso Butyl Salicylate | C |
| Mianin Technical Powder | C |
| Monomethylparamidophenol Sulphate | C |
| Neumol | NC |
| Norolina | C |
| Paramidophenol Sylzauer, Chem. Rein Crist | C |
| Phenyl Dimethyl Aminopyrazolon | NC |
| Phenylglycol Methylene Acetal | NC |
| Physostigmine Salicylate | C |
| Sodium Salicylate BP Flake | C |
| Sodium Salicylate Natural | C |
| Sodium Salicylate and Potassium Bicarbonate | C |
| Untedchloriasaure Salz | C |

**DECEMBER, 1926**

| | |
|---|---|
| Acidophenylsalicylate | NC |
| Amyl Salicylate | C |
| Benzyl Acetate | C |
| Benzyl Propionate | C |
| Beta Naphthol Comp | C |
| Carbolic Acid and Slippery Elm | C |
| Diphenyloxide | C |
| Epinine | C |
| Ethyl Cinnamate | C |
| Fluorescein | C |
| Heliotropine Cryst. Extra | C |
| Homatropine Hydrobromide | C |
| Homatropine Hydrochloride | C |
| Indol Extra Pure 100% | NC |
| Iso Butyl Benzoate | C |
| Iso Butyl Phenylacetate | C |
| Methyl Anthranilate | C |
| Methyl Cinnamate | C |
| Monomethylparamidophenol Sulphate | C |
| Musk Omega | C |
| Paracresol Methylester | C |
| Phenyl Dimethyl Aminopyrazolon | NC |
| Physostigmine Salicylate | C |
| Salol | C |
| Sodium Salicylate Natural | C |
| Viridine Lake 1026 H Powder | C |

**JANUARY, 1927**

| | |
|---|---|
| Acetyltoluene | C |
| Anisic Aldehyde Ordinaire | C |
| Antipyrine | C |
| Benzyl Acetate | C |
| Beta Naphthol Comp | C |
| Bromstyrol | C |
| Butyl Ketone | NC |
| Colchcine Salicylate | C |
| Coumarine Pure 100% | C |
| Diphenyloxide | C |
| Elbon Tabl. | NC |
| Epinine | C |
| Ethylbenzylanilin | C |
| Fluorescein | C |
| Fructines Vichy | NC |
| Gaiarsine Ampoules | NC |
| Heliotropine Cryst. | C |
| Homatropine Hydrochloride | C |
| Hydrocinnamic Alcohol | NC |
| Hydrocinnamic Aldehyde | NC |
| Hypodermic No. 98 | C |
| Indol | NC |
| Methyl Anthranilate | C |
| Methyl Methyl Anthranilate | C |
| Methyl Phenylacetic Acid | C |
| Methylene Blue | C |
| Musk Ketone | C |
| Musk Xylene Residue | C |
| Neumol | NC |
| 100 Fl. Sirop Phenique Acide | NC |
| Phenylacetic Acid | C |
| Phenylacetic Aldehyde | C |
| Phenyl Dimethyl Aminopyrazolon | NC |
| Phenylethyl Alcohol | C |
| Phenysol | C |
| Physostigmine Salicylate | C |
| Plasmochin Comp. Tablets | NC |
| Plasmochin Tablets | NC |
| Uraseptine | NC |
| Yara Yara | C |

## DYE SECTION OF THE A. C. S. HAS SPECIAL PROGRAM FOR RICHMOND MEETING

The spring meeting of the American Chemical Society will be held in Richmond, Va., from April 11 to 15, inclusive.

As Richmond is so near the Southern textile centers, an attempt has been made to place papers on the program of the dye division which will be of interest to users of dyes as well as to manufacturers. Prof. W. D. Bancroft, of Cornell University, will speak on "Theory of Dyeing," and there will be other papers covering the application of dyes to textile fibers from a theoretical and practical standpoint.

Members of the dye division other than textile chemists will also find much to repay their attendance at these meetings. Lieut.-Col. J. B. McMullan, of the Judge Advocate General's Office of the War Department, will take up the subject of invention in the field of organic chemistry dealing with our present chemical patent system. Arrangements have been made for a thorough discussion of this subject, which should prove of exceptional interest to all dye chemists. Dr. William Mansfield, of the Hygienic Laboratory, will tell about his work on "Reversible Oxidation-Reduction in Dye Systems." There will be a number of other contributions on questions of theoretical and practical interest from leading manufacturing and university laboratories.

## PHI PSI

An exceptionally well-attended regular monthly meeting of the Metropolitan Chapter of Phi Psi Fraternity was held Thursday evening, March 10, at the City Club, New York. Alumni residents in and about New York who have not received notices of meetings, are requested to send their names and addresses to D. P. Knowland, 89 Barclay Street, New York City.

# Technical Notes from Foreign Sources

### Colored Effects on Vegetable Fibers

Fabric woven from untreated yarn and yarn which has been mordanted with sulphurized phenols or their homologues and substitution derivatives, or condensation products of such phenols and aldehydes, or products obtained by treating sulphurized phenols with sulphites is piece dyed. Alternatively, fabric woven from untreated and mordanted (with sulphurized phenols) cotton is again mordanted in the piece with sulphurized phenols and then dyed with basic dyestuffs. The twice mordanted yarn then appears darker in shade. (German Patent No. 428,039.)

### Dyeing Fast Shades on Animal Fibers

Shades fast to light and washing are obtained by dyeing wool in the usual manner for acid dyestuffs with dyes produced by coupling arylides of 2:3-hydroxynaphthoic acid with diazotized aromatic compounds containing a sulphonic acid group. For example, a fast red dye is obtained from diazotized 2-chloro-5-toluidine-4-sulphonic acid and 2:3-hydroxynaphthoic acid. The dyeings are after-chromed when the dyes used contain suitable groups, for example, the dye obtained from 6-nitro-2-aminophenol-4-sulphonic acid and 2:3-hydroxynaphthoic acid betanaphthalide. (German Patent No. 428,238.)

### Discharges by Means of Hyposulphites

Leather, skins, horn, celluloid, paper and other materials which are susceptible to the action of heat and hyposulphites are treated with a discharge paste containing a hyposulphite, to which a substance of good heat conductivity may be added, and subjected to the action of acids, in the presence of steam or gases at a suitable temperature. The discharge effect is thus completed in a short time at a temperature below 100 deg. Cent., and the material suffers no damage. (German Patent No. 426,024.)

### Reserving Tannin Color Under Colors

The white fabric is slop-padded with the aid of a solution of tannin. The white resist, consisting of antimony salt (the double salt of antimony fluoride and soda), which contains as well antimony oxide and a basic dyestuff, such as Methylene Blue, Rhodamine and the like, is then printed on the fabric. Thus a tannin ground is slop-padded on the fabric, which is then steamed, passed through a bath of tartar emetic, washed and soaped with savonin. The basic color is fixed in the presence of the antimony salt reserve with the aid of the tannin that is found on the fabric and the over-printing of the ground. The quantity of the tannin which is brought on the white fabric varies in accordance with the intensity of the discharge dyeing that it is desired to obtain. The fact that the antimony salt is added to the basic color and this color paste is then printed on a tannin-treated fabric, which is then simply dried and a tannin color slop-padded on the fabric, deserves particular consideration. The following proportions of ingredients were used:

In the first place, the white fabric was slop-padded with a warm solution, maintained at a temperature of 40 deg. Cent., containing 20 to 30 grams of tannin per liter.

In the second place, the color reserve mixture contained 200 grams of antimony salt, 50 grams of antimony oxide, 700 grams of British gum (1:1), 40 grams of water and 10 grams of a basic dyestuff, such as Methylene Blue 2B, Rhodamine 6GDN Extra concentrated, etc. This makes a total of 1,000 grams of color reserve mixture.

In the third place, the slop-padding bath for obtaining the ground on the fabric consisted of the following ingredients: Thirty to forty grams of a basic color, such as Methylene Heliotrope; 40 to 50 grams of warm water, 150 grams of 7 deg. Be. acetic acid, 250 grams of a tannin solution (1:1), 50 grams of acetin, 200 grams of a gum solution and 270 grams of water, making 1,000 grams in all.

After following out the operations in the customary manner, a product is obtained which shows the first printed basic dyestuff design, which then illuminates the slop-padded ground of the second basic dyestuff. (Der Textilchemiker und Colorist, 1927, pp. 3-4.)

### Preventing Quick Decomposition of Ice Printing Colors

The necessity for cooling ice colors used in the summer is a well-known practice in fabric printing with color pastes containing these dyes. It is customary to use for this purpose a vessel provided with a double bottom in which cold water or a solution of ice and salt is circulated. This practice does prevent the rapid decomposition of the ice color, but certain merchanical difficulties are introduced into the dyeing process. It has been found in actual experience that the loss in color can also be as high as 50 per cent.

This condition has been materially improved by the aid of a very simple apparatus which can be used in every print works. Thus the roller at the inlet to the vat, which is mostly made of wood, is replaced by a hollow roller of copper or iron. One end of the roll is closed and the other provided with a cover which can be tightly bolted down. This roller is filled with a mixture of ice and salt or an ammonium salt. This

makes it possible to control the temperature for hours between 30 and 35 deg. Cent. (Der Textilchemiker und Colorist, 1927, p. 4.)

### Indanthrene Dyeing and Discharge Printing

Indanthrene colors have been used for the production of colored designs on white fabric. Such colors as green, red, yellow, orange, violet and brown have been obtained in addition to blues. The use of these colors makes it possible to obtain effects fast to light and to washing. Particular reference is had in this connection to art linens. The general method of carrying out the manufacture of these reserved dye articles is described below:

The bleached goods are first treated with common reserve paste (copper-blue paste), dried, then dyed with Indanthrene colors and the paste removed by acidification after the dyeing. Then the goods are well washed and soaped thoroughly in a boiling-hot soap liquor. This results in the production of white resist designs on a blue ground. Black on blue contrasted with white effects as well can be obtained by printing with Aniline Black.

The reserve paste has the following composition: One hundred and ten grams of light burnt starch, which are stirred with 275 grams of water and then mixed with 135 grams of copper sulphate; 110 grams of lead nitrate, 215 grams of lead sulphate (approximately 50 per cent), 55 grams of lead acetate. Then this mixture was cooked up with 10 grams of oil, and finally 90 grams of gum thickener are added. The total is 1,000 grams.

It is well to allow the paste to remain for several days before it is used, in order to increase the resistance of the reserve that is printed on the fabric. The dyeing of the printed goods is carried out either in a dipping vat or in a vat provided with rollers, in which the dyeing is continuous.

In the first case the vitriol vat is employed, in which the Indanthrene dyestuff is mixed with iron sulphate, tin salt and sodium hydroxide lye. The hydrosulphite-dekol vat can also be used, in which case the Indanthrene dyestuff is dissolved in hydrosulphite and sodium hydroxide in the presence of dekol. The latter product increases the stability of the vat. The dyeing temperature is approximately 70 to 80 deg. Cent. in the vitriol vat and about 60 deg. Cent. in the dekol vat.

The continuous system is preferred for large production, and the grape sugar-hydrosulphite vat is recommended for this purpose. The goods are led over the series of rollers in the vat and through the liquor, which is maintained at a temperature of 80 deg. Cent. Then it is passed between the rolls and the dyestuff is allowed to oxidize by contact with air; then the fabric is well washed and finished as usual. During the course of the dyeing process a continuous stream of vat liquor is fed into the vat from a tank located at some point above it.

### Discharge Printing

Discharge printing has also been used on calico. Quite a number of the Indanthrene colors can be used in white discharge printing with the Rongalite CL brands, originally introduced for Indigo discharge printing. It is true that there are various difficulties encountered in the discharge printing with Indanthrene dyestuffs, due to their high degree of fastness. It is necessary, for example, to work with somewhat higher proportions of Rongalite, and in most cases caustic alkalies must be employed. Moreover, it is also necessary to use more of the Leukotrope W Conc. contained in the Rongalite CL.

This additional requirement of Leukotrope W can be added to the discharge printing paste in accordance with the nature of the dyeing. In the case of more difficultly dischargeable grounds the goods must nevertheless be previously slop-padded. The goods can mostly be made ready for discharge printing after the ground has been dyed on them in the jigger with a short dye liquor and according to the slop-padding method. This does not entail any preliminary treatment.

The preliminary treatment, when used, consists of 100 to 200 grams of Leucotrope W Conc. per liter of water. After slop-padding, the goods are dried and then printed with a color paste which contains 150 to 200 grams of dark burnt starch, 320 to 430 grams of water, 200 to 300 grams of Rongalite CL, 20 to 30 grams of glycerine and 150 to 200 grams of a 45 deg. Be. sodium hydroxide lye.

The fabric is then dried and steamed for five minutes in a Mather-Platt, passed through boiling water, and soaped with a boiling-hot soap liquor.

A discharge printing paste used on goods which have not been subjected to any previous treatment consists of 20 grams of burnt starch, 130 grams of water, which is mixed with the starch and to which are added 50 grams of Glycerin A, 100 grams of zinc oxide (1:1), 125 grams of Leucotrope W Conc., 300 grams of Rongalite C. All these ingredients are dissolved together with slight heating. Then 275 grams of a 45 deg. Be. solution of sodium hydroxide are added. The total is 1,000 grams.

After the goods have been printed, they are passed through a Mather-Platt machine for five minutes and then washed in boiling-hot water, and finally soaped in boiling-hot soap liquor. (Deutsche Faerber Zeitung, 1927, p. 70.)

### Printing on Fabrics

Matt and luster effects are produced on yarns and fabrics which are composed of viscose rayon in the sulphur state by means of a printing paste which contains sodium sulphite, potassium sulphite, ammonium sulphite, calcium sulphite or other desulphurizing agent which has no deleterious effects on copper printing rollers. The paste may also contain a color dis-

charge substance, such as Formosal, or dyestuffs; for example, a direct color such as Benzo Purpurine, a basic color such as Acridine Orange RS, or a vat dyestuff such as Duranthrene Orange RRT. Other ingredients, as glycerine, British gum, sodium phosphate, sodium hydroxide, potassium carbonate and sodium benzyl sulphanilate, may be added. (British Patent No. 261,099.)

### Immunizing Fibers and Use in Dyeing and Printing

Immunized cotton, obtained by the action of toluene-para-sulphonyl chloride on alkali cellulose, has a harsher handle and much less luster than ordinary cotton. Its resistance to wetting with water is almost equal to that of cotton treated with aluminum acetate and soap. Its properties render it valuable as an effect thread. It is unaffected by storing, sizing or drying, and can be singed without affecting its tenacity. Alkali carbonates, even at high temperatures, have no injurious action, and small additions of soap, sulphonated oils, etc., during bowking can be made with safety.

Very hot dilute solutions of alkali hydroxides tend to cause hydrolysis, but cold concentrated alkalies, for example mercerizing lyes, for a short time do not injure immune yarns. Dilute acids, warm or cold, are not detrimental to white or colored threads, and cold concentrated mineral acids, when in contact for only a short time, do not damage white threads, although some colored ones are affected. Sulphurous acid, hydrosulphite and sulphoxylate, as well as oxidizing agents used in bleaching, can be used for stripping colored threads without affecting the degree of immunization.

Immunized cotton possesses no affinity for direct dyes. Sulphur and vat dyes, on account of their alkali content, and the time and temperature required for the dyeing operation, can be used to a limited extent only. The following possess an affinity for immunized cotton: Some acid dyes, for example Orange II, Acid Violet 4BNS, Alizarine Light Yellow SE; some oxazines, such as Ultra Violet MO; di- and tri-phenylmethane dyestuffs, azines, etc. (Textilberichte, 1926, Vol. 7, p. 765ff.)

### Dyeing of Vat Colors

For the hot dyeing of yarn with such colors as Duranthrene Golden Yellow Y and 2RT, Orange 4R, Blue 3GT, GCD, CC and RD extra, Hydron Yellow NF, Pink FF and FB, Caledon Jade Green and Indanthrene Gray 3B and 2G, the dye bath conveniently contains from 1 to 20 pounds of dyestuff paste, from 10 to 20 pounds of caustic soda (density 1.38) and from 1¼ to 4 pounds of hydrosulphite powder in 150 gallons of water at a temperature of 50 to 60 deg. Cent. for 50 pounds of yarn. With cold dyeing colors, such as Indanthrene Corinth RK, Caledon Yellow 3G and Red FF, Duranthrene Brilliant Violet R, Olive R, Red BN and Red Violet 2RN, only about half the amount of sodium hydroxide is required.

The actual dyeing in this case is carried out at a temperature of 20 to 25 deg. Cent., and for medium or heavy shades the addition of Glauber salt is necessary. This distinction between hot and cold dyeing colors is not rigid. Thus Caledon Jade Green is best dyed at a temperature of 25 to 30 deg. Cent., and Duranthrene Brilliant Violet R and Olive R, Indanthrene Brown R and G can be used as shading colors by the hot dyeing process. Similar but more concentrated baths containing less sodium hydroxide are used for the dyeing of piece goods, and concentrated stock solution is advantageously prepared from 8 pounds of color paste, 5 pounds of sodium hydroxide solution (density 1.38), 1¾ pounds of sodium hydrosulphite and 10 gallons of water at a temperature of 50 to 55 deg. Cent. Precautions are necessary against over-oxidation, and with mixtures of Duranthrene Blues sodium perborate can be used for oxidizing. Lists are given of the colors which are most suitable for hot and cold dyeing of piece goods. In the dyeing of viscose rayon with vat colors skillful and rapid manipulation of the yarn is one of the most important points. (Journal of the Society of Dyers and Colorists, 1925, Vol. 42, pp. 374-376.)

## KNITTING ARTS BANQUET PLANS MADE

The pronounced success of last year's annual banquet of the National Association of Hosiery and Underwear Manufacturers, held at the Commercial Museum during the Knitting Arts Exhibition, made advisable the repetition of this affair under the same conditions.

At 12.30 noon on Wednesday, the 6th of April, the members of this association, which is sponsoring the exhibition, will fill the convention and banquet room of the museum to celebrate the twenty-third anniversary of the show.

The banquet will be the high-light of a week of lectures, demonstrations, get-together meetings, luncheons, suppers and what not, all run by and for the association. Every member has been urged to attend and there is not the least doubt that those who attend will return to their respective mills, offices, shops or factories with more up-to-date knowledge and information than they believed it possible to assimilate in any one week.

While these attractions are going on in the convention room, the exhibition itself will be going full blast with the exception of the few hours that are dominated by the banquet itself. From the information that has come from the office of the management, there will be few machines in any way connected with the knitting industry that will not be represented. There will be many new machines and other new products that will attract considerable attention.

The exhibitors, in applying for tickets to distribute among their customers, have made such increased demands that it is possible several thousands more will have to be printed.

## TEXTILE COLOR CARD ASSOCIATION HOLDS ANNUAL MEETING

### New Fall Shoe and Woolen Colors Are Issued

The valuable work of the Textile Color Card Association in furthering color standardization during the past year was outlined in an interesting report presented at the recent annual meeting of the association by its managing director, Mrs. Margaret Hayden Rorke. The meeting was held at the Hotel Astor, New York City, and was largely attended by representatives of textile and allied trades using color in their products.

Mrs. Rorke, submitting her annual report, said in part:

"During the year 265 members have joined the Textile Color Card Association. Of these, 61 have been outside of the United States, coming from France, Italy, Japan, England, Switzerland, Canada, Germany, Cuba, Austria, Brazil, Scotland, Australia, Latvia and Mexico. The industries represented are most varied. Perhaps the most interesting is that of the automobile industry.

"We have been very rich in the generous co-operation of the Department of Commerce at Washington. Special appreciation is due the Textile Division for their never-failing assistance in furthering the American color cards and the work of this association. The department has sent each season card issued by us to all the American commercial attaches throughout the world. The distribution of our cards in foreign countries has been stimulated by the Government's co-operation.

"During the past year we have issued standard cards, floss and ribbon editions of the seasonal cards, supplementary shoe and leather cards, special millinery cards, and seasonal woolen cards and seasonal hosiery cards."

#### New Fall Shoe Colors

Six shoe colors to be promoted for the fall and winter season of 1927 have just been chosen by the allied shoe and leather committee appointed by the Tanners' Council, National Boot and Shoe Manufacturers' Association and the National Shoe Retailers' Association in co-operation with the Textile Color Card Association.

These colors have been carefully selected by the committee to harmonize with the new garment shades that the woolen, silk and millinery industries will promote for the fall and winter seasons.

#### Woolen Colors for Fall

Forty-eight advance woolen colors for fall, 1927, have been issued by the association to its members. The 1927 fall season woolen card will be out in a short time.

Ranges of coppery, rust and mahogany shades of brown are prominent, including light, middle and dark values. The list contains two ranges of greens—one of yellowish and grayish tones, another of a bluish type. Vagabond Green, Highland Green, Canton Jade and Mountain Green are the newest introductions. Pitchpine and Forest Green are again featured. New blues are Roma Blue and Neapolitan Blue—bright but soft shades with violet undertones. Continental Blue is a dark navy.

A group of twelve sport colors are also featured. These comprise Muskmelon, a salmon pink; Flash, a vermillion tint; Rosestone, a mushroom tone; Araby, an old rose shade; Ripple Green, of bluish tinge, and Blue Aster, a light violet blue.

## BROWN FOR UPHOLSTERY FABRICS AMONG NEW NEWPORT COLORS

A light brown of interest for the dyeing of cotton and rayon for use in upholstery and drapery fabrics has been developed in the laboratories of the Newport Chemical Works, Inc., and is now being marketed under the name Newport Light Fast Brown R. It is described as possessing very good fastness to light and good level dyeing properties, and is specially recommended for dyeing unions of cotton and rayon even in heavy shades. It is practically unaffected by iron and Monel metal, it is further said, and therefore suited for use in machines fitted with these metals. It dyes unions of cotton and wool, cotton and silk, to about the same shade at the boil. Dyed at 180 deg. Fahr., somewhat yellower and brighter shades are obtained. It discharges white.

## CANADA TREBLES EXPORTS OF ACETIC ACID

Attention of American manufacturers is directed to the figures showing exports from Canada to the United States for acetic acid. In 1925, 2,590,931 pounds, valued at $274,419, and for 1926, 7,899,503 pounds, valued at $14,506, are reported from Montreal.

## GERMAN DYES SHIPPED THROUGH PORT OF HAVRE

Coal tar dyes were exported from Havre in much greater quantity during the calendar year 1926, advancing from $24,324 in 1925 to $86,887, according to a dispatch from Consul L. Maynard, Havre.

The coal tar dyes exported from Havre were all of German origin and were assembled at the port for shipment by a Swiss firm.

Dr. Alfred Eisenstein, of Vienna, Austria, and H. B. Jespersen, of Copenhagen, Denmark, are spending a few weeks with Arthur D. Little, Inc., of Cambridge, Mass., with whom they are associated as European correspondents and consultants.

## STORY OF THE FAST FABRIC DEMAND

All the significant phases of the movement for faster textile goods are interestingly outlined in a booklet just issued by the Dyestuffs Division of E. I. du Pont de Nemours & Co., entitled "Fast Dyes—Why? When? How?" Its text is made up of published articles and reports on activities in the textile trades that point to wide and growing recognition of the popular demand for fast colors. The article that appeared in Good Housekeeping magazine on "Colors That Do Not Fade," is given in full. Interesting exerpts from the last Census of Dyes, giving facts on the cost of dyes in fabrics and similar data, make up part of the booklet's contents. The story of the movement to establish fastness standards, sponsored by the Joint Committee of the Textile Industry on Misbranding, is also included, with the complete tentative plan submitted to that committee by the American Association of Textile Chemists and Colorists. This booklet should be read by everyone who makes textiles, dyes them, sells them or buys them. Its message is of supreme importance to the industry.

## RAYON IMPORTS ESTABLISH RECORD

The extent of foreign competition in the rayon manufacturing industry is indicated in the report recently issued by the Department of Commerce giving statistics on imports of rayon yarns, waste, etc., for the year 1926.

The statistics show that total receipts of yarn during 1926 amounted to 10,126,277 pounds, valued at $9,015,975, compared with 7,000,521 pounds and $8,170,893 in 1925, and 1,711,987 pounds and $2,294,558 in 1924.

The average cost per pound of rayon imported during 1926 was 88 cents a pound, country of origin, or $1.33 duty paid basis, New York. However, the average cost per pound on fiber imported in December alone was only 69 cents a pound first cost, or $1.14 duty paid, due principally to the heavy arrivals of Italian yarns at extremely low prices, averaging 56 cents a pound at home and $1 duty paid, believed to be the lowest figure at which imported yarn has been brought into the country in years.

Imports of Italian yarn in December, the bulk shipped by Snia-Viscosa, were the heaviest ever sent by any country to the United States in a single month. The month's consignments from Italy totaled 518,589 pounds, representing more than half the total American imports last month. The second largest figure was registered by Germany last June.

Dr. Lester A. Pratt, director of research of the Merrimac Chemical Company, of Boston, Mass., has been appointed manager of the Anderson Chemical Company Division of the Merrimac Company. He takes the place of H. O. Lichtenwalter, who left to enter another field of activity. Dr. Pratt's office, in turn, has been filled by W. S. Wilson, formerly director of plant development.

## NEW SAMPLE CARD SHOWS BACO DYES

The complete line of aniline colors manufactured by Bachmeier & Co., Inc., of New York, is shown in an exceptionally well-made sample card recently issued to the trade. In all, 184 different shades are displayed, dyed on silk, composing a very colorful array. They are conveniently classified in the card as Direct, Acid, Basic, Alum and Developed Dyes, and full directions are given for their application on various materials.

C. L. McArthur, formerly chief technologist for the F. X. Baumert Company, Inc., cheese manufacturers, has joined the staff of Arthur D. Little, Inc., of Cambridge, Mass. Mr. McArthur spent several years in the capacity of research bacteriologist for the Government and was at one time head of the Department of Bacteriology of the University of Arkansas.

**The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.**

### CHEMIST

Has specialized thoroughly in the analysis, manufacture and application of sizings, softeners and finishing materials and general adhesives. Technical graduate; experienced, capable worker. At present employed. Seeks connection offering opportunity for advancement. Reply Box 376, American Dyestuff Reporter.

### FOR SALE

A complete Dyeing and Finishing Plant located in the Central West, fully equipped with modern machinery; land and buildings suitable for expansion, equipped for the dyeing and finishing of upholstery, denims, dress goods, coatings, cloakings, etc. Reply Box 375, American Dyestuff Reporter.

### EXPERIENCED DYER

Wanted—Experienced dyer for dyeing colors on machine twist. Must have had experience in this class of work. Reply, giving references, to Box 377, American Dyestuff Reporter.

### CHEMICAL SALESMAN

To represent in Eastern territory a well-known concern manufacturing textile chemicals. A textile school graduate with mill training and some selling experience preferred. Reply giving full particulars to Box 378, American Dyestuff Reporter.